INDEX
Special Characters

!! (double exclamation point),
   internal representation of multisets with; 37-9
   operator,
   constructing multisets with; 37-10
^^ (concatenation list operator),
   CPN ML use as list concatenation operator; 30-4
   reference description; 32-14
^ (concatenate string operator),
   reference description; 32-8
~ (negation operator),
   reference description; 32-6
" (double quote),
   type variable use; 30-4
% (if-then selector),
   output arc inscription example; 40-13
   reference description; 41-6
' (single quote),
   type variable use; 30-4
() (parentheses),
   expression specifier use; 36-2
   guards use of; 5-9
* (scalar multiplication operator),
   function scalar multiplication; 41-7
   multiplying multisets; 37-4
   reference description; 32-6, 41-2
+ (addition operator),
   adding multisets; 37-3
   function addition; 41-7
   reference description; 32-6, 41-1
, (comma),
   expression specifier use; 36-2
   guards use as shorthand for boolean andalso operator; 5-9
- (subtraction operator),
   function subtraction; 41-7
   reference description; 32-6, 41-2
/ (division operator),
   reference description; 32-6
/ (if-then-else selector),
   reference description; 41-6
< (less than numeric operator),
   guards; 5-8
< (less than string operator),
   reference description; 32-8
<> (not equal numeric operator),
   guards; 5-8
<< (multiset less than operator),
   reference description; 41-3
   syntax and use; 37-6
<= (multiset less than or equal operator),
   reference description; 41-3
   syntax and use; 37-6
=(less than or equal numeric operator),
   guards; 5-8
=(less than or equal string operator),
   reference description; 32-8
<<= (multiset not equal operator),
   reference description; 41-2
   syntax and use; 37-5
== (equal numeric operator),
   guards; 5-8
== (equal string operator),
   reference description; 32-8
= (numeric equals operator),
   expression specifier use; 36-2
== (multiset equality operator),
   reference description; 37-5, 41-2
> (greater than numeric operator),
   boolean operator used in guards; 5-8
> (greater than string operator),
   reference description; 32-8
>= (greater than or equal numeric operator),
   boolean operator used in guards; 5-8
>= (greater than or equal string operator),
   reference description; 32-8
>>= (multiset greater than or equal operator),
   reference description; 41-3
   syntax and use; 37-6
>>= (multiset greater than or equal operator),
   reference description; 41-3
   syntax and use; 37-6
@ (time append operator),
   appending time list to a one-value multiset with; 39-4
   redefinition in CPN ML; 30-4
   reference description; 41-5
@ (delay expression),
   characteristics and use with time stamps; 12-7
@+ keyword,
   time delay expression use of,
   output arc inscriptions; 39-2
   time regions; 39-3
@ignore keyword,
   ignoring timing on arc inscriptions with; 39-2
[ ] (square brackets),
   expression specifier use; 36-2
   guards use as distinguishing characters; 5-8
Design/CPN Tutorial

\ (backslash operator),
inserting control characters in strings with; 32-8
\ (backquote multiset creation operator),
reference description; 2-8
 reference description; 41-3
 syntax and use; 37-2
{ } (curly braces),
expression specifier use; 36-2

A

abs (absolute value) operation,
reference description; 32-6
abstract datatypes,
not permitted in CPN ML; 30-4
accessing,
record components,
with selector functions; 32-12
statistical variables; 14-3
action,
keyword,
 code segment code action clause identified by;
 40-18
term definition; 13-2
section,
 bar chart code segments; 15-13
 line chart code segments; 15-31
activities,
See transitions;
adding,
See Also creating;
functions,
 with addition operator (+); 41-7
multisets; 2-8, 37-3
 addition operator reference description; 41-1
 places to fusion sets,
 with Fusion Place command (CPN menu); 21-22
to occurrence sets; 22-9
addition operator (+),
adding multisets; 37-3
 reference description; 41-1
 function addition; 41-7
 reference description; 32-6
Adjust (Makeup menu),
reference description; 25-4
adjusting,
See Also aligning;
 adjustment tool,
 characteristics and illustration; 3-6
 graphic object to fit text,
 with Fit to Text command (Makeup menu); 25-5

algorithms,
See Also bindings;
 occurrence set execution; 8-14
 simulator,
 illustrating with SalesNet model execution with conflict; 8-12
 simulator; 8-11
alias colorset,
See Also colorsets;
 characteristics and syntax; 32-17
Align menu,
See Also menus;
 Between command; 29-5
 Bottom to Bottom command; 29-7
 Bottom to Top command; 29-7
 Center command; 29-2
 Circular Spread command; 29-5
 Horizontal command; 29-2
 Horizontal Spread command; 29-4
 Left to Left command; 29-6
 Left to Right command; 29-6
 Position command; 29-3
 Projection command; 29-5
 reference description; 29-1
 Right to Left command; 29-6
 Right to Right command; 29-6
 Top to Bottom command; 29-7
 Top to Top command; 29-7
 Vertical command; 29-2
 Vertical Spread command; 29-5
aligning,
groups,
 with Align menu commands; 29-2
 nodes,
 along a diagonal, See Vertical Spread (Align menu) and Horizontal Spread (Align menu);
 between reference points, with Between (Align menu); 29-5
centered, with Center (Align menu); 29-2
equidistantly around a circle, with Circular Spread (Align menu); 29-5
horizontally, with Horizontal (Align menu); 29-2
relatively, with Position (Align menu); 29-3
vertically, with Vertical (Align menu); 29-2
with Align menu commands; 29-1
andalso (boolean AND),
 boolean operator used in guards; 5-8
andalso (boolean conjunction),
 expression specifier use; 36-2
animation, code segments used for; 40-17

appearance, concurrency, controlling; 8-18
global fusion place; 10-5
hierarchical CP nets, improving; 11-9
hierarchy page, improving; 11-13
markings; 2-12
superpage, improving; 11-11

appending, time lists to multisets; 39-4
time to a one-element multiset,
with time append operator (@); 41-5

Arc (CPN menu), creating arcs with; 4-10
reference description; 21-4

arcs, See Also connectors; CPN objects, classes of;
arcs creation mode,
term definition; 4-10
arc creation tool,
term definition and illustration; 4-10
arc inscription creation mode,
term definition; 4-10
bidirectional,
term definition; 2-13
characteristics; 2-13
as CP net component; 2-1
creating,
connectors from; 23-14
from connectors; 23-13
with Arc (CPN menu); 4-9
drawing,
single and multi-segment; 21-4
endpoint handle use; 21-5
expression evaluation in; 36-8
external,
term definition; 21-17
input,
inscription, term definition; 2-14
inscription, characteristics as CP net component;
2-1
term definition; 2-13
input arc inscriptions, conditional; 40-6
examples; 40-7

arcs (cont’d),
input arc inscriptions (cont’d),
function application use and restrictions; 40-6
if/then/else restrictions; 38-2
overriding time stamps with; 40-5
timing considerations; 39-2
inscription region,
syntax and characteristics; 40-4
term definition; 2-14

inscriptions, characteristics; 2-14
creating; 4-10
missing, reporting with the Syntax Options
command (Set menu); 24-20
term definition; 2-14
merging,
specifying options for; 24-17
output,
bounding CPN variables on; 13-1
delay expressions on; 12-8
evaluating inscriptions during transition firing;
5-14
inscription, term definition; 2-14
inscription, characteristics as CP net component;
2-1
term definition; 2-13
output arc inscriptions,
appending time delays to; 40-6
conditional; 40-6
delay expressions on; 12-8
examples; 40-13
function application use and restrictions; 40-6
if/then/else use in; 38-2
timing considerations; 39-2
rerouting; 11-9
restrictions; 21-4
shape attributes,
changing; 24-8
shapes possible to; 24-5
source/destination nodes,
effect of moving on; 21-4
term definition; 2-13
terminating creation mode; 21-5

arctan operation (arctangent),
reference description; 32-6

arctangent operation (arctan),
reference description; 32-6

arithmetic operators, expressions; 36-3

arrow keys, navigating by means of; 17-2
selecting hidden regions with; 25-9
arrowhead, changing the fill pattern; 24-4

**ASCII characters,**
syntax and characteristics; 32-6

**aspect ratio,**
maintaining while resizing a picture; 23-9
rectangle, preserving; 3-10

assigning, port places,
with Port Assignment command (CPN menu);
21-24
time stamps, example; 12-10

association, expression evaluation; 36-4

attributes, bar charts, redefining; 15-7
chart, changing; 24-14
diagram default, term definition; 4-2
display, changing; 4-2
term definition; 4-2
graphic, changing for selected objects; 24-3
changing system and/or diagram defaults; 24-3

graphical, components; 17-15
selectability, changing; 17-17
selectability, characteristics; 17-17
visibility, changing; 17-17
visibility, characteristics; 17-16

mode, changing; 24-12
changing for supernodes; 24-13
characteristics and components; 17-16
code segments, characteristics; 17-16
current, generating an initial system state with,
using Initial State command (Sim menu); 22-12
included, characteristics; 17-16
interactive, characteristics; 17-16
observable, characteristics; 17-16
prime page, characteristics; 17-16

proposed occurrence sets, characteristics; 17-16
object, components; 17-15
term definition; 4-2, 17-15
page, changing; 24-10

attributes (cont’d),
page (cont’d),
changing system and/or diagram defaults; 24-12
term definition and components; 17-15

regions, changing; 24-8
components; 17-15
shape, changing; 24-5
components; 17-15

system default, term definition; 4-2
term definition and characteristics; 17-15
text,
changing for selected objects; 24-2
changing system and/or diagram defaults; 24-2
components; 17-15

cautions, don’t use free variables with; 40-5

Automatic Run (Sim menu),
reference description; 22-10

automatic simulation,

code generation,

with the Simulation Code Options command (Set menu); 24-21

autoscrolling, characteristics; 3-4

Aux menu, See Also menus;
Box command; 23-3
creating rectangles with; 3-5
commands reference (chapter); 23-1
Connector command; 23-2
creating connectors with; 3-14
Convert to Aux command; 23-14
Convert to CPN command; 23-12
creating auxiliary objects with; 3-3

Ellipse command; 23-5
creating ellipses with; 3-10
Label command; 23-10
creating rectangles with; 3-12

Line command; 23-10
Make Node command; 23-12
Make Region command; 23-11
creating regions with; 3-16

ML Evaluate command; 23-15

Picture command; 23-9
Polygon command; 23-5

Regular Polygon command; 23-7
Rounded Box command; 23-4
Start ML command; 23-15
Aux menu (cont’d),

Stop ML command; 23-15
Wedge command; 23-8

auxiliary,

connectors,

term definition and characteristics; 17-7
nodes,

boxes, creation and manipulation; 23-3
CPN node creation from; 23-12
creating from auxiliary regions; 23-12
creating from CPN nodes; 23-14
ellipses, creation and manipulation; 23-5
labels, creation and manipulation; 23-10
lines, creation and manipulation; 23-10
pictures, creation and manipulation; 23-9
polygons, creation and manipulation; 23-5
region creation from; 23-11
rounded boxes, creation and manipulation; 23-4
rounded polygons, creation and manipulation; 23-7
term definition and characteristics; 17-7
wedges, creation and manipulation; 23-8

objects,

See Also graphical objects;
CPN objects compared with; 4-1
term definition and characteristics; 3-1, 17-6, 17-10

regions,

code segment creation from; 23-13
creating; 23-11
creating auxiliary nodes from; 23-12
creating CPN regions from; 23-12
creating from CPN regions; 23-14
effect of Paste command on; 20-5
guards creation from; 23-13
initial markings creation from; 23-13
log regions creation from; 23-13
place names creation from; 23-13
term definition and characteristics; 17-7
transition names creation from; 23-13

average,

statistical variable values,

obtaining, with SV’avg; 14-3

axis,

rescaling and moving,

as overflow handling methods for line charts; 21-17

backquote (’) multiset creation operator,

creating multisets with,
reference description; 41-3
syntax and use; 37-2

backslash operator (\),

inserting control characters in strings with; 32-8

bar charts,

bar names,
characteristics; 15-3
specifying; 21-11
characteristics and use; 15-2
chart node,
characteristics; 15-2
code segment,
capabilities and uses; 15-11
characteristics and use; 15-8
conditional section use; 15-12
control expression use; 15-12
initialization section use; 15-11
using action section; 15-13
copying; 15-13
creating; 15-4
dialog description; 15-5
with Chart command (CPN menu); 21-10
cutting; 15-13
data analysis,
in Resource Use model; 16-10
defining,
in Resource Use model; 16-9
deleting; 15-14
editing; 15-6
grid lines,
specifying; 21-11
in Resource Use model; 16-8
initializing; 21-12
labels,
supplying; 15-6
legend,
characteristics; 15-3
labels, characteristics; 15-4
name,
specifying; 21-10
pasting; 15-13
patterns,
characteristics; 15-3
positive and negative values,
characteristics; 15-3
redefining the attributes of; 15-7
bar charts (cont’d),
  regions, reference description; 21-11
  saving a copy; 21-12
  title, characteristics; 15-3
  specifying; 21-11
  updating, from transition code segments; 15-10
  specifying values for; 15-9
  update period specification; 21-12
  using SC_upd_chart function in a transition code
  segment; 15-10
  with chart code segment; 15-8
  upper and lower values, characteristics; 15-3
  values, specifying the type and range; 21-13
bars,
  bar chart, specifying; 21-10
  history charts, specifying; 21-10
behavior,
  See Also modeling;
    increasing the realism of; 12-15
Between (Align menu),
  reference description; 29-5
bidirectional arcs,
  term definition; 2-13
Bind (Sim menu),
  reference description; 22-2
  requirements; 22-2
bindings,
  See Also algorithms; occurrence sets; tuples,
    constructors; tuples, patterns;
  adding to occurrence sets, with and without being executed; 22-8
  bind dialog, clearing the editing area; 22-6
    control button meanings; 22-5
    editing area; 22-3
    format description; 22-2
    included bindings list box; 22-4
    potential bindings list box; 22-4
  calculating, all; 22-6
    single; 22-6
  conflict and; 8-6
  CPN variables, output arcs; 13-1
bindings (cont’d),
  creating and editing for CPN variables,
    with Bind command (Sim menu); 22-3
  different,
    explanation of the setting in the Occurrence Set
      Options dialog; 8-22
  elements, executing; 8-13
    term definition; 8-11, 8-18
  enabling,
    identical; 8-3
    multiple; 8-2
  identical,
    explanation of the setting in the Occurrence Set
      Options dialog; 8-22
    included,
      list box format; 22-4
      term definition and characteristics of included
        bindings list box; 22-5
  input arc inscription variables; 5-7
  occurrence set contribution, specifying, with Occurrence Set Options command
    (Set menu); 24-30
  partial,
    term definition and handling in Bind dialog
      editing area; 22-4
  potential,
    list box format; 22-4
    term definition and characteristics of included
      bindings list box; 22-5
  recording information about,
    specification with General Simulation Options
      command (Set menu); 6-10
  regions,
    characteristics; 17-11
  reporting information about,
    with the Simulation Code Options command (Set
      menu); 24-26
  resetting; 22-8
  term definition; 34-1
  transferring from one area of Bind dialog to another; 22-6
Block by Character Count component (Load
  Text command),
  reference description; 19-9
Block by Delimiters component (Load Text
  command),
  reference description; 19-9
blocking,
  blocking options (Save Subdiagram command),
  reference description; 19-9
Index

blocking (cont’d),
character count,
specifying brackets and character counts used by,
with Text Options command (Set menu); 24-18
delimiter,
specifying brackets and character counts used by,
with Text Options command (Set menu); 24-18
Blocking (Page menu),
See Also Cleanup (Page menu); Reduce (Page menu); reference description; 26-2
boolean,
See Also colorsets; expressions; guards;
AND (andalso),
boolean operator used in guards; 5-8
colorsets,
ordering of; 32-28
syntax and characteristics; 32-2
conditional (if/then/else),
expression specifier use; 36-2
conjunction (andalso),
expression specifier use; 36-2
disjunction (orelse),
expression specifier use; 36-2
expressions,
bar chart code segment use of; 15-12
guard use; 40-15
line chart code segment use of; 15-29
operators; 36-3
functions,
standard ML, list of supported; 41-10
NOT (not),
boolean operator used in guards; 5-8
operators,
syntax and characteristics; 32-3
used in guards; 5-8
OR (orelse),
boolean operator used in guards; 5-8
selectors; 41-6
syntax and characteristics; 38-2
tests,
constraining token values with; 5-8
value identifiers,
declaring; 33-2
borders (cont’d),
node,
changing line thickness; 24-4
changing line type; 24-4
page,
changing the size; 24-11
rendering visible or invisible; 24-11
visibility, characteristics; 17-15
borders (cont’d),
region,
deletion requirements; 20-6
Bottom to Bottom (Align menu),
reference description; 29-7
Bottom to Top (Align menu),
reference description; 29-7
bound,
term definition; 5-7
Box (Aux menu),
creating rectangles with; 3-5
reference description; 23-3
boxes,
See Also rectangles;
creating, modifying, and moving; 23-3
shape attributes,
changing; 24-6
term definition and characteristics; 17-5
brackets,
selecting text to a specified,
with Select to Bracket (Text menu); 28-5
square,
guards use as distinguishing characters; 5-8
used by Load Text and Select to Brackets commands,
specifying, with Text Options command (Set menu); 24-17
breakpoints,
See Also simulation;
beginning of substep,
characteristics; 6-16
concurrent execution; 8-4
concurrent execution of SalesNet model; 8-8
SalesNet’s appearance; 8-14
continuing execution after,
with Continue command (Sim menu); 6-17
definition and characteristics; 17-5
end of substep,
characteristics; 6-16
concurrent execution; 8-4
concurrent execution of SalesNet model; 8-8
SalesNet’s appearance; 8-15
restarting simulation after,
with Continue command (Sim menu); 22-10
setting,
all, with Option key plus Stop command (Sim menu); 22-11
with Interactive Simulation Options command (Set menu); 24-27
with Interactive Simulation Options command (Set menu); 6-16
Bring Forward (Makeup menu),
reference description; 25-9
C

C.1 syntax error, meaning; 17-22
C.2 syntax error, meaning; 17-22
C.3 syntax error, meaning; 17-22
C.4 syntax error, meaning; 17-22
C.5 syntax error, meaning; 17-22
C.6 syntax error, meaning; 17-23
C.7 syntax error, meaning; 17-23
C.8 syntax error, meaning; 17-23
C.9 syntax error, meaning; 17-23
C.10 syntax error, meaning; 17-23
C.11 syntax error, meaning; 17-23
C.12 syntax error, meaning; 17-24
C.13 syntax error, meaning; 17-24
C.14 syntax error, meaning; 17-24
C.15 syntax error, meaning; 17-24
C.16 syntax error, meaning; 17-24
C.17 syntax error, meaning; 17-24
C.18 syntax error, meaning; 17-25
C.19 syntax error, meaning; 17-25
C.20 syntax error, meaning; 17-25
canonical expressions, term definition; 36-1
cartesian, coordinates,
  aligning nodes relative to; 29-3
  product,
  See tuples;
case,
  case/of (case),
  expression specifier use; 36-2
control structure, syntax and characteristics; 38-3
expression, output arc inscription example; 40-14
case sensitivity, required,
  with Select to Bracket (Text menu); 28-5
specifying,
  with Find (Text menu); 28-3
causality, See modeling; representation;
Center (Align menu), reference description; 29-2
cf (coefficient) function, syntax and characteristics; 37-7
cf function, reference description; 41-3
Change Marking (Sim menu), reference description; 22-11
Change Shape (Makeup menu), reference description; 25-5
changing, chart attributes; 24-14
connectors, overlay options; 24-15
diagram and/or defaults for shape attributes; 24-5
display attributes; 4-2
fill pattern,
  arrowhead; 24-4
color; 24-5
fusion place type,
  with Fusion Place command (CPN menu); 21-21
fusion set type; 21-23
graphic attributes, for selected objects; 24-3
hierarchy page,
  layout and redrawing options; 24-15
instance fusion place type,
  with Fusion Place command (CPN menu); 21-21
interaction system options; 24-15
lines,
  color; 24-5
mode attributes; 24-12
  for supernodes; 24-13
node border,
  line thickness; 24-4
line type; 24-4
nodes,
  overlay options; 24-15
changing (cont’d),
  nodes (cont’d),
    size and position; 21-8
pages,
  attributes; 24-10
  borders, size; 24-11
  overlay options; 24-15
  page fusion place type; 21-21
  palette, overlay options; 24-15
places,
  markings; 22-11
  size and position; 21-2
regions,
  attributes; 24-8
  color; 24-9
  position; 24-9
  size; 24-9
  with Change Shape command (Makeup menu); 25-6
scrolling display options; 24-15
shape attributes; 24-5
  arcs; 24-8
  boxes; 24-6
  connectors; 24-8
  ellipses; 24-6
  lines; 24-8
  pictures; 24-6
  polygon; 24-7
  rounded boxes; 24-6
  wedges; 24-7
  with Change Shape command (Makeup menu); 25-5
substitution transition modes; 24-12
system and/or diagram defaults,
  for graphic attributes; 24-3
  for page attributes; 24-12
  for text attributes; 24-2
text attributes,
  color; 24-5
  for selected objects; 24-2
transitions,
  size and position; 21-3

characters,
  character count blocking,
    defining brackets and character counts used by; 24-18
    used by Load Text and Select to Brackets commands, specifying; 24-17
    corresponding to an octal code,
      string operation; 32-8
    syntax and characteristics; 32-6

Chart (CPN menu),
  reference description; 21-8
Chart Attributes (Set menu),
  reference description; 24-14
charts,
  attributes,
    changing; 24-14
  bar,
    bar name, characteristics; 15-3
    bars, characteristics; 15-3
    characteristics and use; 15-2
    chart node, characteristics; 15-2
    code segments, capabilities and uses; 15-11
    code segments, characteristics; 15-8
    code segments, conditional section use; 15-12
    code segments, control expression use; 15-12
    code segments, initialization section use; 15-11
    code segments, using action section; 15-13
    copying; 15-13
    creating; 15-4
    creating, dialog description; 15-5
    creating, with Chart command (CPN menu); 21-10
    cutting; 15-13
data analysis, in Resource Use model; 16-10
defining, in Resource Use model; 16-9
deleting; 15-14
editing; 15-6
in Resource Use model; 16-8
initializing; 21-12
legend, characteristics; 15-3
legend labels, characteristics; 15-4
name, specifying; 21-10
nomenclature and illustration; 15-2
pasting; 15-13
patterns, characteristics; 15-3
positive and negative values, characteristics; 15-3
regions, reference description; 21-11
saving a copy; 21-12
specifying bars; 21-10
specifying grid lines; 21-11
specifying the type and range of values; 21-13
specifying title; 21-11
update period specification; 21-12
updating, from transition code segments; 15-10
updating, specifying values for; 15-9
updating, using SC_upd_chart function in a transition code segment; 15-10
updating, with chart code segment; 15-8
upper and lower values, characteristics; 15-3
creating,
  with Chart command (CPN menu); 21-8
creating; 15-1
charts (cont’d),
displaying statistical data with,
in Resource Use model; 16-7
facilities,
(chapter); 15-1
history,
characteristics and use; 15-14
copying; 15-17
creating; 15-14
creating with Chart command (CPN menu); 21-10
cutting; 15-17
data analysis, in Resource Use model; 16-11
defining, in Resource Use model; 16-11
deleting; 15-17
ing Resource Use model; 16-10
pasting; 15-17
redefining; 15-16
regions, reference description; 21-11
saving a copy; 21-12
specifying bars; 21-10
specifying grid lines; 21-11
specifying the type and range of values; 21-13
specifying title; 21-11
specifying values; 15-16
update period specification; 21-12
updating; 15-16
line,
characteristics and use; 15-17
chart node, characteristics; 15-18
code segment, characteristics and use; 15-24,
15-28
code segment, conditional section use; 15-29
code segment, control expression use; 15-29
code segment, initialization section use; 15-28
code segment, using action section; 15-31
conditional drawing of line segments; 15-30
copying; 15-31
creating; 15-19
creating with Chart command (CPN menu); 21-13
creating, dialog description; 15-20
cutting; 15-31
data analysis, in Resource Use model; 16-13
defining, in Resource Use model; 16-13
deleting; 15-31
dialog box; 15-20
grid lines, specifying the characteristics of; 21-15
in Resource Use model; 16-12
initializing; 21-15
legend, characteristics; 15-19
line, characteristics; 15-19
charts (cont’d),
line (cont’d),
lines, specifying the characteristics of; 21-14
nomenclature; 15-17
pasting; 15-31
patterns, characteristics; 15-19
redefining; 15-23
saving a copy; 21-15
specifying methods for handling overflow; 21-17
specifying name; 21-14
specifying origin; 21-16
specifying title; 21-15
specifying values for; 15-25
step updating period; 21-16
time updating period; 21-16
title, characteristics; 15-18
update period specification; 21-16
updating; 15-24
updating, from transition code segments; 15-27
updating, using LC_upd_chart function in a
transition code segment; 15-27
updating, with chart code segment; 15-24
values, specifying the type and range; 21-16
nodes,
See Also CPN objects, classes of;
characteristics and region; 17-9
overview of facilities; 15-1
parts,
term definition; 15-2
statistical variables and,
using (chapter); 16-1
updating,
with Update Chart command (Sim menu); 22-13
updating; 15-1
Child Object (Makeup menu),
navigating with; 17-4
reference description; 25-10
selecting a region with; 11-10
child objects,
selecting,
with Child Object (Makeup menu); 25-10
children,
characteristics; 17-5
term definition; 3-16, 17-5
choice,
See Also modeling;
concurrency and,
(chapter); 8-1
term definition; 8-1
chr (character-octal code) string operation,
reference description; 32-8
circle,
  spacing nodes equidistantly around,
  with Circular Spread (Align menu); 29-5

Circular Spread (Align menu),
  reference description; 29-5

classifying,
  colorsets,
    complexity; 32-2
    size; 32-1

cleaning up,
  pages,
    with Cleanup (Page menu); 26-3

Cleanup (Page menu),
  See Also Blowup (Page menu);
  reference description; 26-3

Clear (Edit menu),
  reference description; 20-6

Clear Report (Sim menu),
  reference description; 22-13

clearing,
  occurrence set; 22-9
  simulation reports,
    with Save Report command (Sim menu); 22-13

  statistical variables; 14-5

clock,
  simulated,
    mechanism, characteristics; 12-3

    term definition; 12-2

cloning,
  regions; 4-11

Close (File menu),
  reference description; 19-3

Close Page (Page menu),
  reference description; 26-2

closing,
  diagram; 1-6

  pages,
    with Close Page (Page menu); 26-2

clr' (value) function,
  syntax and characteristics; 32-23

code,
  generating,
    for different types of execution, Simulation Code
    Options (Set menu); 6-6

code region,
  See code segments;

code segments,
  bar charts,
    characteristics and use; 15-8, 15-11
    conditional section use; 15-12
    control expression use; 15-12
    initialization section use; 15-11

code segments (cont’d),
  characteristics and syntax,
    (chapter); 13-1

  code action clause,
    term definition and characteristics; 13-2

  controlling the execution of,
    for pages; 24-13
    for substitution transitions; 24-12

  creating; 21-6
    from auxiliary regions; 23-13
    deletion requirements; 20-6

  expression evaluation in; 36-9

  functions permitted with,
    with_code; 41-6
    with_time; 41-6

I/O,
  multisets; 37-9

input pattern,
  term definition and characteristics; 13-2

line charts,
  characteristics and use; 15-24, 15-28
  conditional section use; 15-29
  control expression use; 15-29
  initialization section use; 15-28
  using action section; 15-31

mode attribute,
  characteristics; 17-16

output pattern,
  term definition and characteristics; 13-2

reading,
  multisets; 37-9

specifying,
  code generation for; 24-21
  compilation of; 24-23
  simulation; 24-24, 41-6

term definition; 13-1

transitions,
  code action clause syntax and use; 40-18
  examples; 40-19
  input clause syntax and use; 40-17
  output clause syntax and use; 40-18
  region reference description; 40-16

  updating bar charts from; 15-10
  updating line charts from; 15-27

writing,
  multisets; 37-9

coefficient,
  coefficient (cf) function,
    syntax and characteristics; 37-7
  multiset value,
    obtaining, with cf function; 41-3
col’ (value) function,
syntax and characteristics; 32-22

color,
fill pattern,
changing; 24-5
lines,
changing; 24-5
regions,
changing; 24-9
text,
changing; 24-5
colored Petri nets,
See Also CP nets; Design/CPN;
term definition; 1-1
colorsets,
See Also places;
(chapter); 32-1
alias,
syntax and characteristics; 32-17
boolean,
ordering of; 32-28
syntax and characteristics; 32-2
classifying,
complexity; 32-2
size; 32-1
composite,
term definition; 2-5
compound,
See colorsets - alias, lists, records, subsets,
tuples, union;
CPN ML extension; 30-2
creating from auxiliary regions; 23-13
declaring value identifiers with; 33-3
duplicate,
term definition and characteristics; 2-5
enumerated values,
cyclic manipulation of values; 32-24
obtaining position of a particular value; 32-22
obtaining value at particular position; 32-22
ordering of; 32-28
syntax and characteristics; 32-8
term definition; 2-4
first value,
obtaining for small colorsets; 32-21
indexed values,
cyclic manipulation of values; 32-24
obtaining identifier-value for index number; 32-23
obtaining index number for identifier-value; 32-23
obtaining position of a particular value; 32-22
obtaining value at particular position; 32-22
ordering of; 32-28

colorsets (cont’d),
indexed values (cont’d),
syntax and characteristics; 32-9
integers,
ordering of; 32-28
syntax and characteristics; 32-4
term definition; 2-4
testing for membership in; 32-26
large,
characteristics; 32-1
last value,
obtaining for small colorsets; 32-22
lists,
ordering of; 32-28
syntax and characteristics; 32-13
missing,
detecting and handling; 7-2
ordering of; 32-28
reading,
with input_col function; 41-8
real numbers,
ordering of; 32-28
syntax and characteristics; 32-5
testing for membership in; 32-26
records,
constructing multiset for; 32-25
ordering of; 32-28
syntax and characteristics; 32-11
region,
characteristics; 40-3
creating with CPN Region command; 21-5
creation mode, term definition; 4-8
simple,
See colorsets - boolean, enumerated values,
indexed values, integers, real numbers, strings,
unit;
size,
classification; 32-1
obtaining for small colorsets; 32-21
small,
characteristics; 32-1
constants that can be declared for; 32-21
creating multisets for a; 32-21
obtaining first value; 32-21
obtaining last value; 32-22
obtaining size; 32-21
specifying,
with CPN Region (CPN menu); 4-8
strings,
ordering of; 32-28
representation operation; 32-8, 32-19
syntax and characteristics; 32-6
COLORSETS (CONT'D),
  strings (cont'd),
    term definition; 2-4
testing for membership in; 32-26
subsets,
  ordering of; 32-28
syntax and characteristics; 32-15
testing for membership in; 32-26
term definition; 2-3
timed,
  declaring; 12-6, 39-1
defaults; 39-1
removing timing from; 39-1
term definition; 12-2
tuples,
  constructing multiset for; 32-25
ordering of; 32-28
syntax and characteristics; 32-10
term definition; 2-5
union,
  syntax and characteristics; 32-16
testing for membership in; 32-27
unit,
  ordering of; 32-28
syntax and characteristics; 32-2
writing,
  with output_col function; 41-8
COMMA (, ),
guards use as shorthand for boolean andalso operator; 5-9
COMMANDS REFERENCE,
  Align menu (chapter); 29-1
  Aux menu (chapter); 23-1
  CPN menu (chapter); 21-1
  Edit menu (chapter); 20-1
  File menu (chapter); 19-1
  Group menu (chapter); 27-1
  Makeup menu (chapter); 25-1
  Page menu (chapter); 26-1
  Set menu (chapter); 24-1
  Sim menu (chapter); 22-1
  Text menu (chapter); 28-1
COMMENTS,
  CPN ML; 31-3
  in models,
    auxiliary objects use for; 3-1
COMMUNICATION,
  code segments used for; 40-17
COMPARING,
  multisets; 37-5
    equality operator reference description; 41-2
greater than operator reference description; 41-3
  comparing (cont'd),
    multisets (cont'd),
      greater than or equal operator reference
description; 41-3
      less than operator reference description; 41-3
      less than or equal operator reference description; 41-3
      non equal operator reference description; 41-2
  COMPARISON,
    operators,
      strings; 32-8
    used in guards; 5-8
COMPILERS (ML),
See Also CPN ML language;
  comparison of New Jersey and Edinbergh,
specifying, with ML Configuration Options
  command (Set menu); 24-32
COMPILED,
  See switching;
COMPLEXITY,
  colorsets,
    as classification dimension; 32-2
COMPOSITE COLORSET,
See Also colorsets;
term definition; 2-5
COMPOUND,
  See Also colorsets - alias, lists, records, subsets,
tuples, union;
  colorsets,
    characteristics; 32-2
    expressions,
      term definition; 36-1
COMPRESS FUNCTION,
syntax and characteristics; 37-10
CONCATENATE (^) LIST OPERATOR,
reference description; 32-14
CONCATENATION STRING OPERATION (^),
reference description; 32-8
CONCURRENCY,
  See Also time;
    characteristics and implications for CP nets; 8-19
    choice and,
      (chapter); 8-1
    concurrent activities,
      term definition; 8-1
    concurrent system,
      term definition; 8-1
    conflict as limiting factor in; 8-6
    controlling the appearance of; 8-18
    CP net execution; 8-4
    firing multiple concurrent transitions; 8-3
    problems with; 8-1
concurrency (cont’d),
  representing; 8-2
  term definition; 8-1
concurrent,
term definition; 8-19
cond keyword,
  bar chart code segment use of; 15-12
  line chart code segment use of; 15-29
conditional,
  arc inscriptions,
    syntax and characteristics; 40-6
  control structures,
    if/then/else syntax and characteristics; 38-2
  expressions,
    guard use; 40-16
  output arc inscription example; 40-13
  section,
    term definition; 15-12, 15-29
conflict,
  See Also concurrency;
  bindings and; 8-6
  executing SalesNet model with; 8-12
  representing; 8-5
  term definition; 8-1
Connector (Aux menu),
  creating connectors with; 3-14
  reference description; 23-2
connectors,
  See Also arcs;
  arcs (formal CPN connector),
    See arcs;
  auxiliary,
    term definition and characteristics; 17-7
  characteristics; 17-5
  creating; 3-14
    a group of; 27-2
    arcs from; 23-13
    from arcs; 23-14
  deleting,
    dangling; 3-15
  dragging endpoints of,
    with Drag command (Makeup menu); 25-3
  drawing,
    single-segment and multi-segment; 23-2
  duplicating,
    with Duplicate Node command (Makeup menu); 25-6
  editing; 3-15
  effect of,
    Copy command on; 20-4
    Cut command on; 20-2
    hiding regions on; 25-9
connectors (cont’d),
  effect of (cont’d),
    merging nodes on; 25-8
    moving nodes between pages on; 25-7
  Paste command on; 20-5
  endpoint,
    handle, using to reattach a connector; 23-2
    regions, creating; 17-14
    regions, term definition and characteristics; 17-13
  layering order for; 17-1
  merging,
    specifying options for; 24-17
  moving to a different attach point; 23-2
  overlay options,
    changing; 24-15
  routing; 3-14
    deletion requirements; 20-6
  routing,
    automatic; 3-15
  shape attributes; 24-5
  changing; 24-8
  source and destination nodes,
  effect of moving on; 23-2
  substitution,
    characteristics; 17-10
  system,
    characteristics; 17-10
  term definition; 3-2, 3-13, 17-5
  terminating creation mode; 23-3
constants,
  See Also CPN variables;
  first value in colorset,
    syntax and characteristics; 32-21
  input arc inscription example; 40-8
  last value in colorset,
    syntax and characteristics; 32-22
  multisets,
    syntax and characteristics; 32-21, 37-3
  number of values in colorset,
    syntax and characteristics; 32-21
  predefined,
    reference descriptions; 41-1
  size of colorset,
    syntax and characteristics; 32-21
  small colorsets; 32-21
  specifying exact token values with; 5-4
  term definition; 41-1
constraining,
  See Also guards;
  token values; 5-8
  multiple; 5-11
  with more complex guards; 5-10
constraining (cont’d),
token values (cont’d),
with simple guards; 5-9

constraints,
partial,
creating with guards; 5-12
term definition; 5-8

constructing,
See Also creating;
lists,
operators; 32-14
multisets; 37-10
occurrence sets; 8-18

constructors,
characteristics and use; 36-7
lists,
input arc inscription example; 40-11
tuple,
term definition and characteristics; 2-6

Continue (Sim menu),
continuing execution after a breakpoint with; 6-17, 8-15
reference description; 22-10

continuing,
CP net execution,
with Continue command (Sim menu); 6-17

control characters,
inserting in strings; 32-8

control expression,
term definition; 15-12, 15-29

control structures,
boolean selectors,
syntax and characteristics; 38-2
case,
syntax and characteristics; 38-3
if/then/else,
syntax and characteristics; 38-2

controlling,
code segment execution,
for pages; 24-13
for substitution transitions; 24-12
page presence,
during interactive runs; 24-13
during simulation; 24-13
in occurrence sets; 24-13
substitution transition presence,
during interactive runs; 24-12
during simulation; 24-12
in occurrence sets; 24-12

conventions,
CPN ML notation; 30-4
inscription examples; 40-1

Convert to Aux (Aux menu),
reference description; 23-14
Convert to CPN (Aux menu),
reference description; 23-12
converting,
lists,
to multisets, with list_to_ms function; 41-4
multisets,
to lists, with ms_to_list function; 41-4

Copy (Edit menu),
reference description; 20-3
restrictions; 20-4

Copy Defaults (Set menu),
copying diagram defaults with; 4-3
reference description; 24-34

copying,
bar charts; 15-13
diagram defaults,
with Copy Defaults (Set menu); 4-3
history charts; 15-17
line charts; 15-31
regions; 4-11
cos operation (cosine),
reference description; 32-6
cosine operation (cos),
reference description; 32-6
count,
statistical variable values,
obtaining, with SV’count; 14-3

CP nets,
changing,
in the simulator; 8-9
components (chapter); 2-1
creating,
requirements for; 4-3
with Design/CPN editor (chapter); 4-1
example description; 2-2
executing,
(chapter); 6-1
example; 5-13
observation of; 6-16
overview; 2-15, 5-1
hierarchical,
developing on a subpage; 11-14
incremental development,
prime page development,
prime page role; 6-4
modularity,
prime page role; 6-4
setting up for execution; 6-5
structure,
term definition; 1-1
Design/CPN Tutorial

CP nets (cont’d),
syntax errors,
  handling, (chapter); 7-1
term definition and characteristics; 17-5
term definition; 1-1
CPN,
term definition; 1-1
CPN data objects,
  See tokens;
CPN menu,
  See Also menus;
  Arc command; 21-4
  creating arcs with; 4-10
  Chart command; 21-8
  commands reference (chapter); 21-1
  CPN Region command; 21-5
  assigning time stamps with; 12-10
  fixing a syntax error with; 7-4
  naming transitions with; 4-5
Declaration Node command; 21-7
  creating a global declaration node with; 4-12
Fusion Place command; 21-20
  adding places to a fusion set with; 10-6
  creating a fusion set with; 10-4
  deleting fusion sets with; 10-8
  removing places from a fusion set with; 10-7
Move to Subpage command; 21-17
  creating a subpage with; 11-5
  top-down hierarchical CP net development with; 11-15
Place command; 21-2
Port Assignment command; 21-24
  manually assigning ports to sockets with; 11-27
Port Place command; 21-23
Remove Sim Regions command; 21-27
  removing simulation regions with; 6-19
Replace by Subpage command; 21-19
Substitution Transition command; 21-19
Syntax Check command; 21-26
  performing a syntax check with; 6-2
Syntax Options command,
  selecting optional syntax restrictions with; 6-1
  Transition command; 21-3
CPN ML language,
  comments; 31-3
  comparison of New Jersey and Edinbergh compilers; 24-32
configuration options,
  specifying, with ML Configuration Options
  command (Set menu); 24-32
errors,
  detecting; 7-6

CPN ML language (cont’d),
evaluating current text object as; 23-15
extensions to Standard ML; 30-2
features; 30-1
file,
  characteristics and components; 1-3
  identifiers (chapter); 31-1
interpreter,
  starting; 23-15
  stopping; 23-15
introduction (chapter); 30-1
library,
  characteristics and location; 41-9
ML Configuration Options (Set menu),
  reference description; 24-32
ML Evaluate (Aux menu),
  reference description; 23-15
restrictions and modifications of Standard ML; 30-3
role in CP nets; 2-1
runtime environment (chapter); 41-1
standard function,
  list of supported; 41-9

CPN model,
  characteristics; 17-5
  term definition; 1-1
CPN nodes,
  creating,
    auxiliary nodes from; 23-14
    from auxiliary nodes; 23-12
  term definition; 4-1

CPN objects,
  auxiliary objects compared with; 4-1
  classes of,
    See arcs; chart nodes; declaration nodes; places;
      regions; transitions;
    graphical,
      characteristics; 17-6
  term definition; 3-1, 4-1, 17-6

CPN reference variables,
  global,
    syntax and characteristics; 35-3
  instance,
    syntax and characteristics; 35-3
  page,
    syntax and characteristics; 35-3

CPN Region (CPN menu),
  assigning time stamps with; 12-10
  creating guards with; 4-6
  fixing a syntax error with; 7-4
  naming transitions with; 4-5
  reference description; 21-5
Index

**CPN regions**,  
creating; 21-5  
  auxiliary regions from; 23-14  
  from auxiliary regions; 23-12  
  general technique; 4-4  
  multiple; 21-6  
  place regions; 21-5  
effect of Paste command on; 20-5  
restriction on use of CPN Region command; 21-5  
term definition; 4-1  
text,  
specifying options for merging; 24-17

**CPN Settings**,  
term definition and characteristics; 17-18

**CPN variables**,  
(chapter); 34-1  
as CPN ML extension; 30-2  
binding values to,  
  with Bind command (Sim menu); 22-3  
calculated,  
  identification of in included bindings list box; 22-4  
  identification of in potential bindings list box; 22-5  
code segment,  
  restrictions; 40-17  
  use of; 13-1  
declaration syntax; 34-2  
detecting and handling undeclared; 7-4  
expression use; 36-2  
global reference,  
  syntax and characteristics; 35-3  
input arc inscription example; 40-9  
output arcs,  
  binding of; 13-1  
rebinding during transition firing; 5-13  
  records with,  
  input arc inscription example; 40-11  
specifying token values with; 5-7  
term definition and characteristics; 2-9, 34-1  
tuples with,  
  input arc inscription example; 40-10  
unbound,  
  output arc inscription example; 40-14

**creating (cont’d),**  
  auxiliary nodes,  
    from auxiliary regions; 23-12  
    from CPN nodes; 23-14  
  auxiliary regions,  
    from CPN regions; 23-14  
    auxiliary regions; 23-11  
  bar charts; 15-4  
    dialog description; 15-5  
  bindings for CPN variables,  
    with Bind command (Sim menu); 22-3  
  charts; 15-1  
    with Chart command (CPN menu); 21-8  
  code segments,  
    for transitions; 21-6  
    from auxiliary regions; 23-13  
  colorset region (place node),  
    with CPN Region command; 21-5  
  colorsets,  
    from auxiliary regions; 23-13  
  connectors; 3-14  
    from arcs; 23-14  
  CP nets,  
    requirements for; 4-3  
    with Design/CPN editor (chapter); 4-1  
  CPN nodes,  
    from auxiliary nodes; 23-12  
  CPN regions,  
    from auxiliary regions; 23-12  
    general technique; 4-4  
  custom palette page; 24-10  
  diagram; 1-4  
  ellipses; 3-10  
  fusion places,  
    with Fusion Place command (CPN menu); 21-20  
  fusion sets,  
    global; 10-4  
    instance; 10-11  
    page; 10-10  
    with Fusion Place command (CPN menu); 21-20  
  global declaration node,  
    with Declaration Node (CPN menu); 4-12  
  graphical objects; 3-3  
    from text mode; 3-18  
  group,  
    connectors, with Select All Connectors (Group menu); 27-2  
    nodes, with Select All Nodes (Group menu); 27-2  
    regions, with Select All Regions (Group menu); 27-2  
    guard region (transition node); 21-6

Design/CPN Reference Manual for the Macintosh        IDX-17
creating (cont’d),
guards,
  from auxiliary regions; 23-13
  with CPN Region (CPN menu); 4-6
hierarchical CP nets,
  by developing on a subpage; 11-14
hierarchy regions,
  when moving detail to a subpage with Move to Subpage command (CPN menu); 21-18
history charts; 15-14
  with Chart command (CPN menu); 21-10
initial markings,
  from auxiliary regions; 23-13
  with CPN Region command; 21-5
labels; 3-12
  bar charts; 15-6
line charts; 15-19
dialog description; 15-20
  with Chart command (CPN menu); 21-13
lists,
  operators; 32-14
log regions; 21-6
  from auxiliary regions; 23-13
master page; 24-10
multisets; 2-8, 37-2, 37-10
  with multiset creation operator, reference description; 41-3
name regions; 21-6
page instances; 10-11
pages,
  with New Page (Page menu); 4-13, 26-2
partial constraints,
  with guards; 5-12
perimeter transitions,
  when moving detail to a subpage with Move to Subpage command (CPN menu); 21-17
place names,
  from auxiliary regions; 23-13
places,
  multiple; 21-2
  with Place (CPN menu); 4-7
port places,
  when moving detail to a subpage with Move to Subpage command (CPN menu); 21-17
  with Port Place command (CPN menu); 21-23
rectangles; 3-5
  a series of; 3-9
adding text while; 3-9
regions; 3-16
socket places,
  when moving detail to a subpage with Move to Subpage command (CPN menu); 21-17
creating (cont’d),
  statistical variables; 14-2
style sheet; 24-10
subpages; 11-5
substitution transitions; 11-5, 11-15
  when moving detail to a subpage with Move to Subpage command (CPN menu); 21-18
  with Substitution Transition command (CPN menu); 21-19
templates; 24-10
time regions,
  for transitions; 21-6
  from auxiliary regions; 23-13
transitions,
  multiple; 21-3
  names from auxiliary regions; 23-13
  regions from auxiliary regions; 23-13
  with Transition (CPN menu); 4-4
current,
  marking key region,
    term definition; 6-14
marking regions,
  characteristics; 17-10
  removing with Remove Sim Regions command (CPN menu); 21-27
term definition; 6-14
markings,
  term definition; 2-11
object,
  term definition; 3-18
state,
  term definition; 2-11
value statistical variable,
  obtaining, with SV'value; 14-4
cursor keys,
  navigating to an error with; 7-4
custom palette page,
  creating; 24-10
  using; 24-11
Cut (Edit menu),
  reference description; 20-2
  restrictions; 20-3
cutting,
  bar charts; 15-13
  history charts; 15-17
  line charts; 15-31
cyclic manipulation,
  of enumerated and indexed value colorsets; 32-24
D

data,
   analysis,
      bar charts in Resource Use model; 16-10
      history charts in Resource Use model; 16-11
      line charts in Resource Use model; 16-13
   characteristics as CP net component; 2-1
   objects,
      See tokens;
datatypes,
   See Also colorsets;
      abstract,
         not permitted in CPN ML; 30-4
   CPN,
      See colorsets;
      functions; 38-1
   user-defined,
      See colorsets;
DB file,
   characteristics and components; 1-3
debugging,
   ML Evaluate command (Aux menu),
      use for testing new and changed code; 23-15
   optional syntax errors,
      specifying which to be reported, with the Syntax
         Options command (Set menu); 24-18
Declaration Node (CPN menu),
   creating a global declaration node with; 4-12
   reference description; 21-7
declaration node tool,
   term definition and illustration; 4-12
declaration nodes,
   See Also CPN objects, classes of;
   as CPN ML extension; 30-3
   creating,
      multiple; 21-8
      with Declaration Node command (CPN menu); 21-7
   global,
      creating, with Declaration Node (CPN menu); 4-12
      term definition; 2-3
      restrictions; 21-8
   term definition and types; 17-9
declarations,
   See colorsets: global, declaration node;
declare clause,
   syntax and characteristics; 32-18
declaring,
   functions,
      syntax and characteristics; 38-1

declaring (cont’d),
   local variables,
      with let construct; 38-1
decomposition,
   See substitution transitions;
defaults,
   diagram,
      changing; 17-19
      copying; 17-19
   page attributes, changing; 24-12
   shape attributes, changing; 24-5
   term definition and characteristics; 17-18
   text attributes, changing; 24-2
   using; 17-19
   standard,
      term definition; 17-18
   system,
      changing; 17-19
      copying; 17-19
   page attributes, changing; 24-12
   shape attributes, changing; 24-5
   term definition and characteristics; 17-18
   text attributes, changing; 24-2
   using; 17-19
defining,
   bar charts,
      in Resource Use model; 16-9
   history charts,
      in Resource Use model; 16-11
   line charts,
      in Resource Use model; 16-13
   occurrence set,
      with a single binding; 22-8
delay expressions,
   See Also time;
   term definition; 12-7
deleting,
   See Also creating;
   bar charts; 15-14
   connectors,
      dangling; 3-15
      fusion sets; 10-8
         with Fusion Place command (CPN menu); 21-22
      graphical objects; 3-19
      history charts; 15-17
      line charts; 15-31
      occurrence set; 22-9
      parents; 3-17
      rectangles; 3-8
      subpages; 11-23
      references to; 11-24
delimiter blocking,
specifying brackets and character counts used by,
with Text Options command (Set menu); 24-18
descendants,
objects,
impact of CPN Region command on; 21-7
term definition and characteristics; 17-5
deselecting,
See Also selecting;
groups; 3-21
Design/CPN,
See Also CP nets;
characteristics and components; 1-2
data,
characteristics; 2-3
dynamics,
executing a CP net, (chapter); 6-1
introduction, (chapter); 5-1
term definition and characteristics; 17-5
editor,
creating a CP net (chapter); 4-1
introduction (chapter); 3-1
getting started with,
(chapter); 1-1
hierarchy,
characteristics; 9-2
Macintosh characteristics relative to; 1-2
quitting; 1-7
settings file missing or obsolete,
problem symptoms and solutions; B-1
simulator,
See simulator;
starting; 1-3
term definition; 1-1
terminology; 1-1
user interface components; 1-4
designating,
See Also specifying;
prime page; 6-4
detecting errors,
See troubleshooting;
diagonal,
spacing nodes along,
See Vertical Spread (Align menu) and Horizontal
Spread (Align menu);
diagrams,
characteristics and components; 1-3
closing; 1-6
creating; 1-4
defaults,
attributes, term definition; 4-2
changing; 17-19
changing graphic attributes; 24-3
diagrams (cont’d),
defaults (cont’d),
changing shape attributes; 24-5
characteristics; 17-18
copying; 4-3, 17-19
page attributes, changing; 24-12
setting system defaults with; 24-34
term definition; 4-2
text attributes, changing; 24-2
using; 17-19
file,
characteristics and components; 1-3
navigating; 1-5, 17-1
opening; 1-4
printing; 1-6
reswitching,
with Reswitch command (Sim menu); 22-13
term definition; 1-2
different bindings,
explanation of the setting in the Occurrence Set
Options dialog; 8-22
Displace (Makeup menu),
reference description; 25-4
displacing,
oobjects,
with Displace command (Makeup menu); 25-4
display,
attributes,
changing; 4-2
graphical objects, term definition; 3-2
term definition; 4-2
during simulation,
specifying, with Interactive Simulation Options
command (Set menu); 24-27
overlapping objects,
specifying the; 24-4
display attributes,
See attributes;
displaying,
page borders,
rendering visible or invisible; 24-11
page instance name,
with Select Instance command (Sim menu); 22-12
regions,
with Show Regions (Makeup menu); 25-9
dist’ (distance) function,
syntax and characteristics; 32-24
division operation (/),
reference description; 32-6
documenting,
models,
with auxiliary objects; 3-1
double quote (" ),
type variable use; 30-4
double-clicking,
editor regions; 17-3
hierarchy page node; 17-3
port places; 17-3
simulator regions; 17-3
substitution transitions; 17-3
Drag (Makeup menu),
moving a region with; 11-10
reference description; 25-2
drag tool,
illustration; 25-2
rectangles; 3-8
dragging,
endpoints of connectors,
with Drag command (Makeup menu); 25-3
objects,
with Drag command (Makeup menu); 25-2
drawing,
See Also creating;
areas,
single and multi-segment; 21-4
connectors,
single-segment and multi-segment; 23-2
environment,
resetting; 3-5
expression,
term definition; 15-30
graphics tool used for; 3-3
rectangles; 3-5
tool,
term definition; 3-2
duplicate colorsets,
See Also colorsets;
term definition and characteristics; 2-5
Duplicate Node (Makeup menu),
reference description; 25-6
duplicating,
objects,
with Duplicate Node command (Makeup menu); 25-6
dynamics,
Design/CPN,
executing a CP net, (chapter); 6-1
introduction, (chapter); 5-1

E

Edit menu,
See Also menus;
Clear command; 20-6
commands reference (chapter); 20-1
Copy command; 20-3
Cut command; 20-2
Get Info command; 20-7
Paste command; 20-5
Redo command; 20-2
Undo command; 20-2
editing,
See Also creating;
area,
bind dialog; 22-3
bar charts; 15-6
bindings for CPN variables,
with Bind command (Sim menu); 22-3
connectors; 3-15
history charts; 15-16
line charts; 15-21
regions; 3-17
text; 3-13
editor,
Design/CPN,
creating a CP net (chapter); 4-1
introduction (chapter); 5-1
key/popup regions,
creating and deleting; 17-13
list; 17-12
options,
command that access; 17-17
regions,
changing the visibility of; 17-3
Ellipse (Aux menu),
creating ellipses with; 3-10
reference description; 23-5
ellipses,
See Also graphical objects; places;
creating; 3-10
and manipulating; 23-5
creation mode,
characteristics; 3-11
shape attributes,
changing; 24-6
tool,
characteristics and illustration; 3-11
empty multiset,
   See Also multisets;
   constant,
       reference description; 41-1
   syntax and characteristics; 37-3
   term definition; 2-7

enabled,
   list,
       putting all enabled transitions on, for SalesNet
       model execution with conflict; 8-12
       scanning, for SalesNet model execution with
       conflict; 8-12
       term definition; 8-11
       updating, for SalesNet model execution with
       conflict; 8-16

enablement,
   See Also algorithms; bindings; occurrence sets;
   criteria for; 5-3
   enabling bindings,
       identical; 8-3
       multiple; 8-2
       factors determining; 5-2
       simulated time impact on; 12-3
       simulation region identifying; 6-15
       term definition; 5-2

enabling,
   bindings,
       conflict issues; 8-6
   term definition; 5-8
   multiset,
       term definition; 5-3

drawings,

endpoint,
   arcs,
       handle use; 21-5
       handle,
           connectors, using to reattach a connector; 23-2
   regions,
       characteristics; 17-11
       creating; 17-14
       term definition and characteristics; 17-13

enlarging,
   pages,
       with Blowup (Page menu); 26-2

Enter Editor (File menu),
   leaving the simulator with; 6-19
   reference description; 19-12

Enter Group Mode (Group menu),
   reconstructing groups with; 3-21
   reference description; 27-2

Enter Simulator (File menu),
   entering the simulator with; 6-12
   reference description; 19-12

Enter Simulator (File menu) (cont’d),
   specifying which errors reported,
       with the Syntax Options command (Set menu); 24-18

Enter Text Mode (Text menu),
   adding text to rectangles with; 3-9
   reference description; 28-2

entering,
   See Also leaving;
   group mode,
       with Enter Group Mode (Group menu); 27-2
       simulator; 6-12
           with a saved state; 6-12
           text; 3-13
           mode; 28-2

entities,
   See modeling; representation;

enumerated values,
   See Also colorsets;
   colorsets,
       cyclic manipulation of values; 32-24
       obtaining position of a particular value; 32-22
       obtaining value at particular position; 32-22
       ordering of; 32-28
       syntax and characteristics; 32-8
       term definition and characteristics; 2-4

environment,
   drawing,
       resetting; 3-5
       establishing; 4-3
   graphical,
       setting; 4-2
   runtime,
       ML (chapter); 41-1

equal (=),
   boolean operator used in guards; 5-8

equal string operation (=),
   reference description; 32-8

equality multiset (==) operator,
   syntax and use; 37-5

equality operator (==),
   comparing multisets with,
       reference description; 41-2

errors,
   error box,
       interpreting; 7-3
       term definition; 7-2
   locating,
       with text pointers; 7-3
   missing colorset,
       fixing; 7-4
errors (cont’d),
   ML,
      detecting; 7-6
   reporting,
      Syntax Check command (CPN menu) use for;
      21-26
   syntax,
      detecting, with the Syntax Check command (CPN
      menu); 6-1
      handling, (chapter); 7-1
      list of syntax check error messages; 17-22
      missing colorset; 7-2
      optional, specifying which to be reported, with
      the Syntax Options command (Set menu);
      24-18
      undeclared CPN variables; 7-4
      undeclared CPN variables, fixing; 7-4
essential graphical objects,
   term definition and characteristics; 17-5
establishing,
   See Also creating; specifying;
   environment; 4-3
evaluating,
   ML code; 23-15
   output arc inscription,
   during transition firing; 5-14
examples,
   procedures for testing; 30-5
exception mechanism,
   CPN ML feature; 30-2
exclamation points,
   double (!!),
   internal representation of multisets with; 37-9
   operator for constructing multisets; 37-10
executing,
   CP nets,
      (chapter); 6-1
      concurrent execution; 8-4
      overview; 5-1
      occurrence set elements; 8-13
      SalesNet model with conflict; 8-12
execution,
   concurrent,
      SalesNet model; 8-7
   CP nets,
      overview; 2-15
exp operation (exponential),
   reference description; 32-6
experimenting,
   See modeling;

exponential operation (exp),
   reference description; 32-6
expressions,
   (chapter); 36-1
   arcs,
   missing, reporting with the Syntax Options
   command (Set menu); 24-20
   boolean,
   bar chart code segment use of; 15-12
   line chart code segment use of; 15-29
   used in guards; 5-8
   canonical,
   term definition; 36-1
   compound,
   term definition; 36-1
   constructors; 36-3, 36-7
      lists; 36-8
      tuples; 36-8
   control,
   term definition; 15-29
   delay,
   syntax and characteristics; 12-7
   drawing,
   term definition; 15-30
   evaluation; 36-4
   association; 36-4
   in CP nets; 36-8
   operator precedence; 36-4
   order; 36-4
   inscription,
   term definition; 36-1
   multiset,
   syntax; 37-2
   patterns; 36-6
      list pattern matching; 36-7
      tuple pattern matching; 36-7
   simple,
   term definition; 36-1
   syntax specifiers and reserved words; 36-2
   term definition; 36-1
extent,
   term definition; 34-1
external arcs,
   term definition; 21-17
ext_col function,
   reference description; 41-4
   syntax and characteristics; 37-8
ext_ms function,
   reference description; 41-4
   syntax and characteristics; 37-8
**Design/CPN Tutorial**

**F**

**fair automatic simulation,**
characteristics; 6-7
specifying, with General Simulation Options command (Set menu); 24-24

**fair interactive simulation,**
characteristics; 6-7
specifying, with General Simulation Options command (Set menu); 24-24

**fair simulation,**
term definition and code generation; 24-21

**fast automatic simulation,**
characteristics; 6-7
specifying,
with General Simulation Options command (Set menu); 24-24
term definition and code generation,
with the Simulation Code Options command (Set menu); 24-21

**feedback region,**
removing,
with Remove Sim Regions command (CPN menu);
21-27
term definition; 6-15

**File menu,**
See Also menus;
Close command; 19-3
commands reference (chapter); 19-1
Enter Editor command; 19-12
leaving the simulator with; 6-19
Enter Simulator command; 19-12
entering the simulator with; 6-12
Load IDEF command; 19-10
Load State command; 19-11
loading execution states with; 5-16
Load Subdiagram command; 19-8
Load Text command; 19-9
New command; 19-2
Open command; 19-2
Page Preview command; 19-5
Page Setup command; 19-6
Print command; 19-7
Quit command; 19-13
Revert command; 19-5
Save As command; 19-5
Save command; 19-3
Save State command; 19-10
saving execution states with; 5-15
Save Subdiagram command; 19-7

**File menu (cont’d),**
Save Text command; 19-8

**file system,**
characteristics and Design/CPN components; 1-3

**fill pattern,**
changing; 24-4
color,
changing; 24-5

**fill pattern,**
reference description; 41-4
syntax and characteristics; 37-8

**filter function,**
multisets; 37-8
with filter function; 41-4

**Find (Text menu),**
reference description; 28-3

**Find Beginning (Text menu),**
reference description; 28-4

**Find Next (Text menu),**
reference description; 28-4

text,
in a group, with Find (Text menu); 28-4
with Find (Text menu); 28-3

**fire,**
term definition; 5-12

**firing,**
current transitions; 8-3
simulation region identifying; 6-15

**first constant,**
syntax and characteristics; 32-21

**first value,**
statistical variable,
leaving the simulator with; 6-19

**Fit to Text (Makeup menu),**
reference description; 25-5

**fn (function),**
expression specifier use; 36-2

**fn reserved word,**
function datatype indicated by expression using; 38-1

**free variables,**
term definition; 40-5

**full multiset constant,**
syntax and characteristics; 37-3

**fun reserved word,**
declaring functions with; 38-1

**functional language,**
CPN ML feature; 30-1

**functions,**
(chapter); 38-1
addition of,
with addition operator (+); 41-7
### functions (cont’d),

- **application,**
  - output arc inscription example; 40-13
- **arc inscription use and restrictions;** 40-6
- **boolean,**
  - standard ML, list of supported; 41-10
- **cf (coefficient) function;** 37-7, 41-3
- **clr’ function;** 32-23
- **col’ function;** 32-22
- **compress function;** 37-10
- **datatype;** 38-1
- **declaring,**
  - syntax and characteristics; 38-1
- **Design/OA,**
  - use and restrictions; 41-8
- **dist’ (distance) function;** 32-24
- **expressions;** 33-4
  - declaring value identifiers with; 33-4
- **ext_col function;** 37-8, 41-4
- **ext_ms function;** 37-8, 41-4
- **filter function;** 37-8, 41-4
- **fn (function);** 36-2
  - expression specifier use; 36-2
- **function;** 41-1, 41-5
- **function type operator,**
  - association rule; 36-5
- **I/O,**
  - standard ML, list of supported; 41-12
- **identity function;** 41-7
- **ign function;** 41-7
- **in’ function;** 32-26
- **index’ (index number) function;** 32-23
- **input_col function;** 41-8
- **input_ms function;** 37-9, 41-5, 41-8
- **input_tms function;** 41-8
- **integer,**
  - standard ML, list of supported; 41-10
  - invoking; 38-3
- **less than (lt’ function;** 32-16, 32-19
- **linear extension;** 37-8
  - creating, with ext_col and ext_ms functions; 41-4
- **list,**
  - standard ML, list of supported; 41-11
  - list_to Ms function; 37-8, 41-4
- **lt’ (less than) function;** 32-16, 32-19
- **membership (in’) function;** 32-26
- **membership (of_id’) function;** 32-27
- **ms_to_list function;** 37-8, 41-4
- **mult’ function;** 32-25, 37-5, 41-2
- **multiply multiset (mult’) function;** 32-25
- **of_id’ function;** 32-27
- **ord’ (ordinal number) function;** 32-22

### functions (cont’d),

- **output arc inscription example;** 40-13
- **output_ms function;** 37-9, 41-5, 41-8
- **output_tms function;** 41-8
- **predefined,**
  - reference descriptions; 41-1
- **ran’ (random value) function;** 32-16, 32-18
- **random function;** 37-7, 40-5, 40-15, 41-4
- **random value (ran’);** 32-16, 32-18
- **real,**
  - standard ML, list of supported; 41-10
- **realtime,**
  - standard ML, list of supported; 41-12
- **record selector function;** 32-1
- **reference,**
  - standard ML, list of supported; 41-12
- **rot’ (rotation) function;** 32-24
- **scalar multiplication of,**
  - with scalar multiplication operator (*); 41-7
- **size function;** 37-7, 41-3
- **step function;** 41-5
- **stop_simulation function;** 41-6
- **string,**
  - standard ML, list of supported; 41-11
- **subtraction of,**
  - with subtraction operator (-); 41-7
- **SV’avrg function;** 14-3
- **SV’count function;** 14-3
- **SV’first function;** 14-4
- **SV’init function;** 14-5
- **SV’maximum function;** 14-4
- **SV’minimum function;** 14-4
- **SV’ss function;** 14-5
- **SV’ssd function;** 14-5
- **SV’std function;** 14-4
- **SV’sum function;** 14-5
- **SV'value function;** 14-4
- **SV’vari function;** 14-5
- **term definition;** 41-1
- **time function;** 39-2, 40-15
- **time function;** 41-5
- **time-related;** 39-4
- **trigonometric;** 32-6
- **value (clr’ function;** 32-23
- **value (col’ function;** 32-22
- **with_code function;** 41-6
- **with_time function;** 39-4, 41-6
- **write_report function;** 41-6
- **zero function;** 41-7

### fusion,

- **key region,**
  - term definition and illustration; 10-6
**Design/CPN Tutorial**

**fusion (cont’d),**
- names, characteristics and use; 17-21
term definition; 17-20
places,
  - (chapter); 10-1
  - changing the type of; 21-21
  - characteristics; 9-2
  - creating; 21-20
effect of duplication on; 25-6
effect of moving nodes between pages on; 25-7
instance, changing the type of; 21-21
instance, renaming; 21-21
instance, term definition; 10-13
multiple pages; 10-8
page, changing the type of; 21-21
page, renaming; 21-21
page, term definition; 10-10
renaming; 21-21
single page; 10-3
term definition; 9-2, 10-1
turning non-fusion places into; 21-23
regions,
  - CPN Region command restricted from creating; 21-5
deletion requirements; 20-6
term definition; 10-6
sets,
  - adding places to; 10-6, 21-22
  - changing the type of; 21-23
  - creating; 21-20
deleting; 21-22
global, creating; 10-4
global, term definition; 10-5
impact on the results of the Change Marking command (Sim menu); 22-11
initial markings and; 10-7
instance, creating; 10-11
instance, simulation with; 10-14
moving places between; 21-23
multiple, working with; 10-9
multiplicity and; 10-12
naming conventions; 21-23
page, creating; 10-9
page, term definition; 10-9
page-spanning, working with; 10-8
removing places from; 10-7
selecting; 27-3
subtracting places from; 21-22
term definition; 9-2, 10-1
turning fusion places into non-fusion places; 21-23

**fusion (cont’d),**
- subsets,
  - instance, term definition; 10-13
  - page, term definition; 10-10

**Fusion Place (CPN menu),**
- adding places to a fusion set with; 10-6
creating a fusion set with; 10-4
deleting fusion sets with; 10-8
reference description; 21-20
removing places from a fusion set with; 10-7

**General port place,**
- characteristics; 21-24

**General Simulation Options (Set menu),**
- reference description; 24-23
selecting the termination conditions with; 6-9
selecting the type of simulation with; 6-8

**generating,**
- See Also creating;
code,
  - for different types of execution, Simulation Code Options (Set menu); 6-6
initial system state,
  - with Initial State command (Sim menu); 22-12

**Get Info (Edit menu),**
- reference description; 20-7

**getting started with Design/CPN,**
- (chapter); 1-1

**global,**
- declaration nodes,
  - creating; 4-12, 21-7
  - creating a page for; 4-13
  - declaration, term definition; 4-12
declaring a timed colorset in; 12-6
term definition; 2-3

**fusion places,**
- changing the type of; 21-21
physical appearance; 10-5
renaming; 21-21
term definition; 10-5

**fusion set,**
- term definition; 10-5
reference variables,
syntax and characteristics; 35-3
term definition and characteristics; 17-6

**Graphic Attributes (Set menu),**
- reference description; 24-3
graphical,
animation,
code segments used for; 40-17
attributes,
changing for selected objects; 24-3
changing system and/or diagram defaults; 24-3
components; 17-15
environment,
setting; 4-2
term definition; 4-2
functions,
Design/OA, use and restrictions; 41-8
objects,
adjusting to fit text; 25-5
characteristics; 3-2, 17-5
creating; 3-3
creating, from text mode; 3-18
deleting; 3-19
editing; 3-2
multiple, working with different types; 3-15
multiple, working with; 3-18
selecting; 3-18
term definition; 3-1, 17-5

graphics,
Design/CPN editor,
(chapter); 3-1
enabled transitions,
specifying with Transition Feedback Options
command (Set menu); 24-31
graphics tool,
term definition and illustration; 3-3
mode,
characteristics; 3-2
term definition; 3-2
updating during simulation,
specifying, with Interactive Simulation Options
command (Set menu); 24-28
greater than operator (>),
boolean operator used in guards; 5-8
greater than multiset operator (>>,)
comparing multisets with,
reference description; 41-3
syntax and use; 37-6
greater than string operator (>),
reference description; 32-8
greater than or equal operator (>=),
boolean operator used in guards; 5-8
greater than or equal multiset operator (>>=),
comparing multisets with,
reference description; 41-3
syntax and use; 37-6
greater than or equal string operator (>=),
reference description; 32-8

grid lines,
bar chart,
specifying; 21-11
history chart,
specifying; 21-11
line chart,
specifying the characteristics of; 21-15
Group menu,
See Also menus;
commands reference (chapter); 27-1
Enter Group Mode command; 27-2
reconstructing groups with; 3-21
Leave Group Mode command; 27-2
deselecting groups with; 3-21
Select All Connectors command; 27-2
Select All Nodes command; 27-2
Select All Regions command; 27-2
Select Fusion Set command; 27-3
selecting groups with; 3-20
groups,
aligning,
with Align menu commands; 29-2
creating,
with Select All Connectors (Group menu); 27-2
with Select All Nodes (Group menu); 27-2
with Select All Regions (Group menu); 27-2
deselecting; 3-21
effect of,
Copy command on; 20-4
Cut command on; 20-2
Paste command on; 20-5
group tool,
characteristics and illustration; 3-20
mixed,
restrictions; 3-20
mode,
detecting when system is in both text mode and;
28-2
entering; 27-2
leaving; 27-2
Select command (Makeup menu) not available
during; 25-2
term definition; 3-20
moving,
to another page, with Move Node command
(Makeup menu); 25-7
to beginning of; 28-4
operations on; 3-22
reconstructing; 3-21
groups (cont’d),
  searching and replace in,
  with Find (Text menu); 28-4
  selecting; 3-20
  term definition; 3-19

guards,
  See Also input arc inscriptions;
  as CP net component; 2-1
  constraining,
    input arc inscriptions with; 40-9
    the values of tokens with; 5-8
  creating,
    from auxiliary regions; 23-13
    partial constraints with; 5-12
    with CPN Region (CPN menu); 4-6
  expression evaluation in; 36-9
  functions not permitted with,
    with_code; 41-6
    with_time; 41-6
  guard region creation mode,
    term definition; 4-6
  if/then/else restrictions; 38-2
  regions,
    creating; 21-6
    role in determining enablement; 5-3
  syntax; 5-8
  term definition and characteristics; 2-14, 5-8
  transition,
    region syntax, use, and restrictions; 40-15

H

handles,
  See Also arcs; connectors;
  connector endpoint,
    using; 23-2
  term definition; 3-7

handling,
  syntax errors,
    (chapter); 7-1

hidden,
  regions,
    selecting with arrow keys; 25-9

Hide Regions (Makeup menu),
  reference description; 25-9

hiding,
  regions,
    with Hide Regions (Makeup menu); 25-9

hierarchy,
  See Also fusion; substitution transitions;

  See Also input arc inscriptions; hierarchical decomposition,
    as CP net component; 2-1
term definition and characteristics; 1-5
  constraining, hierarchy key region,
    term definition; 11-8
  introduction,
    (chapter); 9-1
  objects,
    effect of duplication on; 25-6
    effect of moving nodes between pages on; 25-7
  page,
    appearance after top-down development; 11-16
    changing the layout and redrawing options; 24-15
    characteristics and components; 1-5
    error box location on; 7-2
    for a hierarchical CP net diagram; 11-2
    improving appearance; 11-13
    moving detail to a subpage of with Move to
      Subpage command (CPN menu); 21-17
    navigating to pages from; 17-3
    redrawing; 26-3
    renaming pages from; 4-14
  regions,
    CPN Region command restricted from creating;
      21-5
    creating when moving detail to a subpage; 21-18
    deletion requirements; 20-6
    term definition; 11-8
    term definition; 9-2

Hierarchy Page Options (Set menu),
  reference description; 24-15

history charts,
  bar names,
    specifying; 21-11
  bars,
    specifying; 21-10
  characteristics and use; 15-14
  copying; 15-17
  creating; 15-14
    with Chart command (CPN menu); 21-10
  cutting; 15-17
  data analysis,
    in Resource Use model; 16-11
  defining,
    in Resource Use model; 16-11
  deleting; 15-17
  editing; 15-16

IDX-28  Design/CPN Reference Manual for the Macintosh
if-then-else selector (/),
  reference description: 41-6
if/then/else (boolean conditional),
  expression specifier use: 36-2
ign function,
  reference description: 41-7
ignoring,
  with zero function: 41-7
in’ (membership) function,
  syntax and characteristics: 32-26
included (mode attribute),
  characteristics: 17-16
incremental net development,
  prime page role: 6-4
indeterminacy,
  term definition: 8-1
index’ (index number) function,
  syntax and characteristics: 32-23
indexed values,
  See Also colorsets;
  colorsets,
    cyclic manipulation of values: 32-24
    obtaining identifier-value for index number: 32-23
    obtaining index number for identifier-value: 32-23
    obtaining position of a particular value: 32-22
    obtaining value at particular position: 32-22
    ordering of: 32-28
    syntax and characteristics: 32-9
input arc inscription example: 40-10
init keyword,
  bar chart code segment use of: 15-11
  line chart code segment use of: 15-28
initial markings,
  See Also places;
  changing: 8-9
  creating from auxiliary regions: 23-13
  creation mode,
    term definition: 4-9
  establishing,
    for SalesNet model execution with conflict: 8-12
  functions permitted with,
    with_code: 41-6
    with_time: 41-6
  fusion sets and: 10-7
  region (place),
    syntax and characteristics: 40-3
  regions,
    creating with CPN Region command: 21-5
    initializing with Initial State command (Sim menu): 8-10
    term definition and characteristics: 2-12

identical bindings,
  explanation of the setting in the Occurrence Set Options dialog: 8-22
identifiers,
  CPN ML (chapter): 31-1
  duplication of,
    when permitted: 31-2
    predeclared: 31-2
identity function,
  reference description: 41-7
if-then selector (%),
  reference description: 41-6
if-then-else expression,
  output arc inscription example: 40-13

I, J

I/O,
  arc inscriptions not permitted to use: 40-5
  code segments used for: 40-17
  functions,
    standard ML, list of supported: 41-12
    input/output port,
      characteristics: 21-24
      multiset,
        with input_ms and output_ms functions: 41-5
      multiset: 37-9
identical bindings,
  explanation of the setting in the Occurrence Set Options dialog: 8-22
identifiers,
  CPN ML (chapter): 31-1
  duplication of,
    when permitted: 31-2
    predeclared: 31-2
identity function,
  reference description: 41-7
if-then selector (%),
  reference description: 41-6
if-then-else expression,
  output arc inscription example: 40-13

history charts (cont’d),
grid lines,
  specifying: 21-11
  in Resource Use model: 16-10
initializing: 21-12
pasting: 15-17
redefining: 15-16
regions,
  reference description: 21-11
saving a copy: 21-12
specifying values: 15-16
title,
  specifying: 21-11
  update period specification: 21-12
  updating: 15-16
values,
  specifying the type and range: 21-13
Horizontal (Align menu),
  reference description: 29-2
Horizontal Spread (Align menu),
  reference description: 29-4
hypertext,
  using text pointers as: 28-4
**initial markings (cont’d),**
specifying,
  with CPN Region (CPN menu); 4-9
term definition; 40-3
time stamps and; 12-9

**initial state,**
term definition; 2-11

**Initial State (Sim menu),**
initializing SalesNet after changing in the simulator; 8-10
initializing the CP net state with; 6-18
reference description; 22-12

**initialization section,**
term definition; 15-11, 15-28

**initializing,**
bar charts; 21-12
history charts; 21-12
line charts; 21-15
statistical variables; 14-2

**initiating,**
automatic simulation,
  with Automatic Run command (Sim menu); 22-10
interative simulation,
  with Interactive Run command (Sim menu); 22-10

**input,**
keyword,
  code segment input clause identified by; 40-17
term definition; 13-2
multiset; 37-9
pattern,
  code segment, term definition and characteristics; 13-2
place,
  multiset, role in determining enablement; 5-3
term definition; 2-13
port,
  characteristics; 21-24
token regions,
  characteristics; 17-11
removing with Remove Sim Regions command
  (CPN menu); 21-27

**input arcs (cont’d),**
specifying,
  with CPN Region (CPN menu); 4-9
role in determining enablement; 5-3
specifying, with constants; 5-4
specifying, with CPN variables; 5-7
term definition; 2-14
timing considerations; 39-2
term definition; 2-13

**input col function,**
reference description; 41-8

**input ms function,**
reference description; 41-5, 41-8
syntax and characteristics; 37-9

**input tms function,**
reference description; 41-8

**inscriptions,**
(chapter); 40-1
arc inscription region,
  term definition; 2-14
arcs,
  detecting errors in; 7-6
  missing, reporting with the Syntax Options command (Set menu); 24-20
term definition and characteristics; 2-14
example diagram; 40-2
expressions,
  term definition; 36-1
if/then/else restrictions and uses; 38-2
input arc,
  characteristics as CP net component; 2-1
  conditional; 40-6
  examples; 40-7
  function application use and restrictions; 40-6
  overriding time stamps with; 40-5
term definition; 2-14
timing considerations; 39-2
output arc,
  appending time delays to; 40-6
  characteristics as CP net component; 2-1
  conditional; 40-6
delay evaluations on; 12-8
evaluating during transition firing; 5-14
examples; 40-13
function application use and restrictions; 40-6
term definition; 2-14
timing considerations; 39-2
term definition; 40-1
types of; 40-1

**instances,**
  fusion places,
    changing the type of; 21-21

instances (cont’d),
  fusion places (cont’d),
  renaming; 21-21
  term definition; 10-13
fusion sets,
  creating; 10-11
  simulation with; 10-14
fusion subsets,
  term definition; 10-13
pages,
  creating; 10-11
  displaying name of; 22-12
  specifying the number of; 24-13
reference variables,
  syntax and characteristics; 35-3
term definition; 10-13
pages,
  creating; 10-11
  displaying name of; 22-12
  specifying the number of; 24-13
reference variables,
  syntax and characteristics; 35-3
invoking,
  functions; 38-3
invisible,
  objects,
    rendering; 24-4
  page borders,
    rendering for display or printing; 24-11
K
key regions,
  characteristics; 17-11
  editor,
    creating and deleting; 17-13
    list; 17-12
  simulator,
    creating and deleting; 17-13
    list; 17-12
  term definition and characteristics; 6-15, 17-7, 17-11
keys and shortcuts,
  (chapter); A-1
keywords,
  action,
    term definition; 13-2
  cond,
    bar chart code segment use of; 15-12
    line chart code segment use of; 15-29
  init,
    bar chart code segment use of; 15-11
    line chart code segment use of; 15-28
  input,
    term definition; 13-2
  output,
    term definition; 13-2
L
Label (Aux menu),
  creating rectangles with; 3-12
  reference description; 23-10
labels,
  bar charts,
    creating; 15-6
    creating, modifying, and moving; 3-12, 23-10
differences between graphical objects and; 3-13
label creation mode,
  characteristics; 3-12
label tool,
  characteristics and illustration; 3-12
labels (cont’d),
resizing,
without moving the center, with Adjust command (Makeup menu); 25-4
term definition and characteristics; 3-2, 17-5
language characteristics,
CPN ML; 30-1
large,
See Also colorsets;
colorsets,
characteristics; 32-1
last constant,
syntax and characteristics; 32-22
layered,
term definition; 17-1
layering,
objects,
changing, with Bring Forward (Makeup menu); 25-9
overlapping objects,
specifying the; 24-4
layering order,
regions; 17-1
Leave Group Mode (Group menu),
deselecting groups with; 3-21
reference description; 27-2
Leave Text Mode (Text menu),
reference description; 28-2
leaving,
See Also entering;
group mode,
with Leave Group Mode (Group menu); 27-2
text mode; 28-2
Left to Left (Align menu),
reference description; 29-6
Left to Right (Align menu),
reference description; 29-6
length,
lists,
specifying; 32-13
strings; 32-8
less than (lt’) function,
syntax and characteristics; 32-19
union colorset selector use; 32-16
less than operator (<),
boolean operator used in guards; 5-8
less than multiset operator (<<),
syntax and use; 37-6
less than string operator (<),
reference description; 32-8
less than or equal operator (<=),
boolean operator used in guards; 5-8
less than or equal multiset operator (<=),
comparing multisets with,
reference description; 41-3
syntax and use; 37-6
less than or equal string operator (<=),
reference description; 32-8
let construct,
declaring local variables within a function; 38-1
expression specifier use; 36-2
Line (Aux menu),
reference description; 23-10
line charts,
axis labels,
characteristics; 15-18
box,
characteristics; 15-18
characteristics and use; 15-17
chart node,
characteristics; 15-18
code segment,
characteristics and use; 15-24, 15-28
conditional section use; 15-29
control expression use; 15-29
initialization section use; 15-28
using action section; 15-31
conditional drawing of line segments; 15-30
copying; 15-31
creating; 15-19
dialog description; 15-20
with Chart command (CPN menu); 21-13
cutting; 15-31
data analysis,
in Resource Use model; 16-13
defining,
in Resource Use model; 16-13
deleting; 15-31
dialog box; 15-20
editing; 15-21
grid lines,
specifying the characteristics of; 21-15
in Resource Use model; 16-12
initializing; 21-15
labels,
supplying; 15-21
legend,
characteristics; 15-19
labels, characteristics; 15-19
lines,
characteristics; 15-19
specifying the characteristics of; 21-14
name,
specifying; 21-14
line charts (cont’d),
   nomenclature; 15-17
   origin,
      specifying; 21-16
   overflow,
      specifying methods for handling; 21-17
   pasting; 15-31
   patterns,
      characteristics; 15-19
   redefining; 15-23
   regions,
      specifying; 21-15
   saving a copy; 21-15
   specifying; 15-25
   lines, characteristics; 21-14
   step updating period; 21-16
   time,
      updating period; 21-16
   title,
      characteristics; 15-18
      specifying; 21-15
   updating,
      from transition code segments; 15-27
      specifying values for; 15-25
      update period specification; 21-16
      using LC_upd_chart function in a transition code
      segment; 15-27
      with chart code segment; 15-24
   updating values,
      specifying the type and range; 21-16
   X and Y axes,
      characteristics; 15-18
line feed,
   inserting in strings; 32-8
linear extension,
   functions; 37-8
   creating, with ext_col and ext_ms functions; 41-4
lines,
   changing,
      color; 24-5
      fill pattern; 24-4
      thickness; 24-4
   creating, modifying, and moving; 23-10
   line chart,
      specifying the characteristics of; 21-14
      shape attributes; 24-5
      changing; 24-8
list concatenation operator,
   redefinition in CPN ML; 30-4
lists,
   See Also colorsets;
lists (cont’d),
   colorsets,
      ordering of; 32-28
      syntax and characteristics; 32-13
   constructing,
      operators; 32-14
   constructors,
      characteristics and use; 36-8
   input arc inscription example; 40-11
   converting,
      multisets to/from; 37-8
      to multisets; 41-4
   expression,
      constructors; 36-3
      operators; 36-3
   functions,
      standard ML, list of supported; 41-11
   length,
      specifying; 32-13
   operators and functions; 32-14
   patterns,
      characteristics and use; 36-7
      input arc inscription example; 40-11
      specifying,
         in expressions; 36-2
      in subset declarations; 32-15
      value identifiers,
         declaring; 33-3
list_to_ms function,
   reference description; 41-4
   syntax and characteristics; 37-8
ln operation (natural logarithm),
   reference description; 32-6
Load IDEF (File menu),
   reference description; 19-10
Load State (File menu),
   loading execution states with; 5-16
   reference description; 19-11
   restrictions; 19-12
Load Subdiagram (File menu),
   reference description; 19-8
Load Text (File menu),
   reference description; 19-9
Load Text command,
   specifying brackets and character counts used by,
      with Text Options command (Set menu); 24-17
loading,
   See Also saving;
   execution states,
      with Load State (File menu); 5-16
Design/CPN Tutorial

**local**,  
(let/in/end),  
extension specifier use; 36-2  
nodes,  
creating; 21-7  
term definition and characteristics; 17-6  
variables,  
declaring with let construct; 38-1

**locality**,  
See concurrency; modeling;

**locking**,  
objects; 24-4  
regions relative to the parent,  
with Size component (Region Attributes command-Set menu); 24-9

**log regions**,  
characteristics and use; 13-3  
creating; 21-6  
from auxiliary regions; 23-13

**logarithm**,  
natural,  
operation (In); 32-6

**lt' (less than) function**,  
union colorset selector use; 32-16, 32-19

**Makeup menu (cont’d)**,  
Next Object command; 25-11  
navigating with; 17-4  
Parent Object command; 25-10  
navigating with; 17-4  
Previous Object command; 25-11  
navigating with; 17-4  
Select command; 25-2  
Show Regions command; 25-9

**mapping**,  
inputs to output,  
role of the simulator in; 8-3  
multisets,  
with filter function; 41-4  
multisets; 37-8

**markings**,  
appearance of; 2-12  
current,  
simulation regions describing; 6-14  
term definition; 2-11  
initial,  
characteristics; 2-12  
places,  
changing, with Change Marking command (Sim menu); 22-11  
term definition and characteristics; 2-11

**master page**,  
creating; 24-10

**maximal occurrence rule**,  
term definition; 24-30

**maximum**,  
statistical variable,  
obtaining, with SV’max; 14-4

**membership**,  
testing for,  
in a subset of a colorset; 32-26  
in a union colorset component; 32-27

**membership (in’) function**,  
syntax and characteristics; 32-26

**membership (of_id’) function**,  
syntax and characteristics; 32-27

**menus**,  
See Also Align menu; Aux menu; CPN menu; Edit menu; File menu; Group menu; Makeup menu; Page menu; Set menu; Sim menu; Text menu; Design/CPN,  
overview (chapter); 18-1  
menu bar,  
characteristics; 1-4

**Merge Node (Makeup menu)**,  
See Also Merge Options (Set menu);  
reference description; 25-8
Merge Options (Set menu),
  reference description; 24-16
merging,
  arcs,
    specifying options for; 24-17
  connectors,
    specifying options for; 24-17
  nodes,
    into a single node, with Merge Node command (Makeup menu); 25-8
    specifying options for; 24-16
  text in CPN regions,
    specifying options for merging; 24-17
  text in nodes,
    specifying options for merging; 24-17
minimum,
  statistical variable,
    obtaining, with SV'min; 14-4
mkst_col' operation,
  string representation for colorset operation; 32-8
  syntax and characteristics; 32-19
mkst_ms' operation,
  string representation for multiset operation; 32-8
  syntax and characteristics; 32-20
ML,
  See CPN ML;
ML Configuration Options (Set menu),
  See Also CPN ML language;
  reference description; 24-32
ML Evaluate (Aux menu),
  See Also CPN ML language;
  reference description; 23-15
mode,
  attributes,
    changing; 24-12
    changing for supernodes; 24-13
    characteristics and components; 17-16
    current, generating an initial system state with;
    22-12
  graphics,
    term definition; 3-2
  graphics editor,
    term definition; 3-2
  non-text,
    navigating in; 17-2
  pages,
    changing; 24-13
  regions,
    characteristics; 17-10
    deletion requirements; 20-6
    substitution transitions,
    changing; 24-12
mode (cont’d),
  text,
    navigating in; 17-3
    term definition; 3-2
Mode Attributes (Set menu),
  creating multiple page instances with; 10-11
  designating prime pages with; 6-4
  reference description; 24-12
model,
  development,
    specifying which optional syntax errors to be reported; 24-18
    testing new and changed code; 23-15
    options,
      characterstics and commands that access; 17-17
    ResmodSubtrans,
      hierarchy page; 11-2
      subpage; 11-3
      superpage; 11-3
      term definition; 1-1
      time,
      term definition; 12-3
modeling,
  See Also behavior; choice; representation;
  Resource Use model,
  improvement suggestions; 16-15
  Resource Use model; 16-1
models,
  See FirstModel model; FirstNet model; FirstNetDemo model; Resource Use model; Sales Order model; SalesNet model;
modifier keys,
  characteristics and use; A-2
modularity,
  See Also hierarchy;
  CP nets,
    prime page role; 6-4
modules,
  not permitted in CPN ML; 30-4
Move Node (Makeup menu),
  reference description; 25-7
Move to Subpage (CPN menu),
  creating a subpage with; 11-5
  reference description; 21-17
  top-down hierarchical CP net development with;
  11-15
moving,
  See Also navigating;
    connectors to a different attach point; 23-2
    groups,
    to another page, with Move Node command (Makeup menu); 25-7
moving (cont’d),
groups (cont’d),
with Align menu commands; 29-2
nodes,
to a different page, with Open Page (Page menu); 4-15
to another page, with Move Node command (Makeup menu); 25-7
with Align menu commands; 29-1
objects,
with Displace command (Makeup menu); 25-4
with Drag command (Makeup menu); 25-2
parents; 3-17
places between fusion sets; 21-23
rectangles; 3-8
during creation; 3-8
regions; 11-10
to beginning of current text object,
with Find Beginning (Text menu); 28-4
ms reserved word,
declaring multisets with; 37-1
syntax and characteristics; 32-21
ms_to_list function,
reference description; 41-4
syntax and characteristics; 37-8
multiplication,
(*) operator,
reference description; 32-6
scalar, multiplying multisets; 37-4
mult’ function,
multiplying multisets with; 37-5
reference description; 41-2
syntax and characteristics; 32-25
multiplicity,
fusion and; 10-12
page instances,
specifying; 24-13
term definition; 10-11, 17-16
multiplying,
functions,
scalar multiplication, with scalar multiplication operator (*); 41-7
multisets; 32-25
mult’ function reference description; 41-2
scalar multiplication operator reference description; 41-2
with mult’ function; 37-5
with scalar multiplication (*) operator; 37-4
multiprocessing,
Design/CPN use of; 1-2
multiset creation operator (’),
creating multisets with,
reference description; 41-3
syntax and use; 37-2
multisets,
See Also colorsets;
(chapter); 37-1
adding; 2-8, 37-3
addition operator reference description; 41-1
appending time list to; 39-4
coefficient of values in,
obtaining, with cf function; 41-3
comparing; 37-5
equality operator reference description; 41-2
greater than operator reference description; 41-3
greater than or equal operator reference description; 41-3
less than operator reference description; 41-3
less than or equal operator reference description; 41-3
non equal operator reference description; 41-2
constants,
syntax and characteristics; 37-3
constructing; 37-10
for tuple or record colorsets; 32-25
converting,
lists to/from; 37-8
to lists; 41-4
creating; 37-2
for a small colorset; 32-21
with multiset creation operator, reference description; 41-3
declaring value identifiers with; 33-4
designator,
term definition and characteristics; 2-8
empty,
constant syntax and characteristics; 37-3
predefined constant representing; 41-1
term definition; 2-7
enabling,
term definition; 5-3
expressions,
syntax; 37-2
filtering,
with filter function; 41-4
full,
constant syntax and characteristics; 37-3
I/O of; 37-9
input place,
role in determining enablement; 5-3
internal representation of; 37-9
multisets (cont’d),
  linear extension of functions,
    creating, with ext_col and ext_ms functions; 41-4
  mapping; 37-8
  multiplying; 32-25
    mult’ function reference description; 41-2
    scalar multiplication operator reference description; 41-2
    with mult’ function; 37-5
    with scalar multiplication (*) operator; 37-4
  number of elements in,
    obtaining,
    random values from; 37-7
    the number of elements in; 37-7
    with size function; 41-3
  output,
    term definition; 5-14
  random value,
    obtaining, with random function; 41-4
  reading,
    with input_ms function; 41-5, 41-8
  removing enabling from each input place,
    during transition firing; 5-13
  specifying; 2-8
  string representation operation; 32-8, 32-20
  subsetting; 2-9
  subtracting; 2-8, 37-4
    subtraction operator reference description; 41-2
  term definition and characteristics; 2-7, 37-1
  time stamps and; 12-10
  timed; 37-10
  variables,
    term definition, syntax, and use; 37-1
    with CPN variables,
      input arc inscription example; 40-9
    with enumerated values,
      input arc inscription example; 40-9
    writing,
      with output_ms function; 41-5, 41-8

names (cont’d),
  entering; 17-21
  fusion,
    characteristics and use; 17-21
  generating; 17-20
  line charts,
    specifying; 21-14
  name region creation mode,
    term definition; 4-6
  page,
    duplicate, reporting with the Syntax Options command (Set menu); 24-20
    instance, displaying with Select Instance command (Sim menu); 22-12
    ML-illegal, reporting with the Syntax Options command (Set menu); 24-19
    term definition; 17-20
  places,
    changing; 17-21
    creating from auxiliary regions; 23-13
    duplicate, reporting with the Syntax Options command (Set menu); 24-19
    entering; 17-21
    missing, reporting with the Syntax Options command (Set menu); 24-19
    ML-illegal, reporting with the Syntax Options command (Set menu); 24-19
    syntax and characteristics; 40-2
    term definition; 17-20
  syntax; 17-20
  transition,
    changing; 17-21
    creating from auxiliary regions; 23-13
    duplicate, reporting with the Syntax Options command (Set menu); 24-20
    entering; 17-21
    missing, reporting with the Syntax Options command (Set menu); 24-19
    ML-illegal, reporting with the Syntax Options command (Set menu); 24-20
    region reference description; 40-14
    term definition; 17-20
  types of; 17-20
  unacceptable to the Occurrence Graph Analyzer,
    reporting with the Syntax Options command (Set menu); 24-20
    using; 17-20

naming,
  conventions,
    fusion sets; 21-23

N
naming (cont’d),
  pages,
    with Page Attributes (Set menu); 4-14
places,
    with CPN Region (CPN menu); 4-7
simulation reports,
    with Save Report command (Sim menu); 22-13
substitution transitions; 11-8
transitions,
    with CPN Region (CPN menu); 4-5

natural logarithm operation (ln),
  reference description; 32-6

navigating,
  See Also moving;
by arrow keys; 17-2
diagrams; 17-1
  hierarchy page use for; 1-5
from subpage to superpage,
  by double-clicking on a port; 11-5
in non-text mode; 17-2
in text mode; 17-3
means of; 17-2
objects; 17-1
with Design/CPN commands; 17-4

negation operation (~),
  reference description; 32-6

New (File menu),
  reference description; 19-2

New Page (Page menu),
  creating a page for global declarations with; 4-14
reference description; 26-2

Next Object (Makeup menu),
  navigating with; 17-4
reference description; 25-11

nodes,
  See Also regions;
aligning,
  between reference points, with Between (Align menu); 29-5
centered, with Center (Align menu); 29-2
horizontally, with Horizontal (Align menu); 29-2
relatively, with Position (Align menu); 29-3
vertically, with Vertical (Align menu); 29-2
with Align menu commands; 29-1
auxiliary,
  boxes, creating, modifying, and moving; 23-3
creating CPN nodes from; 23-12
creating from auxiliary regions; 23-12
creating from CPN nodes; 23-14
creating regions from; 23-11
ellipses, creating, modifying, and moving; 23-5
labels, creating, modifying, and moving; 23-10

nodes (cont’d),
  auxiliary (cont’d),
  lines, creating, modifying, and moving; 23-10
pictures, creating, modifying, and moving; 23-9
polygons, creating, modifying, and moving; 23-5
rounded boxes, creating, modifying, and moving;
  23-4
rounded polygons, creating, modifying, and
  moving; 23-7
term definition and characteristics; 17-7
wedges, creating, modifying, and moving; 23-8

see Also
  moving; changing line thickness; 24-4
changing line type; 24-4
changing,
  shape; 25-5
size and position; 21-8
chart,
  characteristics and region; 17-9
creating with Chart command (CPN menu); 21-8
connector source and destination,
  effect of moving on; 23-2
converting regions into; 3-17
CPN,
  creating auxiliary nodes from; 23-14
creating from auxiliary nodes; 23-12
creating a group of,
  with Select All Nodes (Group menu); 27-2
declaration,
  as CPN ML extension; 30-3
creating multiple; 21-8
creating with Declaration Node command (CPN menu); 21-7
restrictions; 21-8
term definition and types; 17-9
duplicating,
  with Duplicate Node command (Makeup menu); 25-6
effect of,
  Copy command on; 20-3
Cut command on; 20-2
hiding regions on; 25-9
Paste command on; 20-5
error,
  characteristics; 21-26
global,
  creating with Declaration Node command (CPN menu); 21-7
global declaration,
term definition; 2-3

IDX-38    Design/CPN Reference Manual for the Macintosh
nodes (cont’d),
local,
  creating with Declaration Node command (CPN menu); 21-7
merging,
  into a single node; 25-8
  specifying options for; 24-16
moving,
  to a different page, with Open Page (Page menu); 4-15
  to another page, with Move Node command (Makeup menu); 25-7
  with Align menu commands; 29-1
overlay options,
  changing; 24-15
page,
  characteristics; 17-10
  deletion requirements; 20-6
  navigating to a page from; 17-3
projecting a line of,
  with Projection (Align menu); 29-5
regions and; 3-16
repositioning,
  with Align menu commands; 29-1
resizing,
  with Change Shape command (Makeup menu); 25-5
  without moving the center, with Adjust command (Makeup menu); 25-4
selecting all,
  with Select All Nodes (Group menu); 27-2
shapes possible to; 24-5
source/destination,
  effect on arcs of moving; 21-4
spreading,
  along a diagonal, See Vertical Spread (Align menu)
  and Horizontal Spread (Align menu);
equidistantly around a circle, with Circular Spread (Align menu); 29-5
  horizontally, with Horizontal Spread (Align menu); 29-4
  vertically, with Vertical Spread (Align menu); 29-5
system,
  characteristics; 17-10
temporary,
  creating with Declaration Node command (CPN menu); 21-7
term definition and characteristics; 3-2, 3-13, 17-5
terminating declaration mode; 21-8
text,
  specifying options for merging; 24-17
non-text mode,
  navigating in; 17-2
not (boolean NOT),
  boolean operator used in guards; 5-8
not equal operator (< >),
  boolean operator used in guards; 5-8
not equal multiset operator (<< >>),
  comparing multisets with,
    reference description; 41-2
    syntax and use; 37-5
not equal string operator (<>),
  reference description; 32-8
notation,
  CPN ML; 30-4
numbers,
  See Also integers; real numbers;
    changing; 17-21
    entering; 17-21
    syntax; 17-20
    term definition; 17-19
    using; 17-20

O

objects,
  See Also arcs; auxiliary; connectors; labels; nodes;
    regions; text;
    attributes,
      term definition and components; 17-15
auxiliary,
  characteristics; 17-7, 17-10
  term definition and characteristics; 17-6
changing,
  preventing the; 24-4
  the order on a page for; 25-9
  the shape of; 25-5
collections of,
  copying; 23-9
  cutting; 23-9
  pasting; 23-9
CPN,
  classes of, See arcs; chart nodes; declaration nodes; places; regions; transitions;
  compared with auxiliary; 3-1
  term definition and characteristics; 17-6
custom palette page,
  creating; 24-10
  using; 24-11
data,
  See tokens;
Design/CPN Tutorial

objects (cont’d),
descendants,
impact of CPN Region command on; 21-7
difficult to select,
accessing with Select (Makeup menu); 17-4
duplicating,
with Duplicate Node command (Makeup menu); 25-6
essential graphical,
term definition and characteristics; 17-5
gathering information about; 20-7
graphical,
term definition and characteristics; 3-1, 17-5
hidden,
selecting, with Select command (Makeup; 25-2
hierarchy,
term definition and characteristics; 17-5
invisible,
rendering; 24-4
locking; 24-4
navigating; 17-1
non-selectable,
locking and unlocking; 24-4
original parent,
term definition and characteristics; 17-5
overlapping,
specifying display and printing of; 24-4
repositioning,
with Displace command (Makeup menu); 25-4
with Drag command (Makeup menu); 25-2
resizing,
with Change Shape command (Makeup menu); 25-5
without moving the center, with Adjust command
(Makeup menu); 25-4
selecting,
the next object in the layering order, with Next
Object (Makeup menu); 25-11
the previous object in the layering order, with
Previous Object (Makeup menu); 25-11
with Select command (Makeup menu); 25-2
selecting the parent of,
with Parent Object (Makeup menu); 25-10
system,
term definition and characteristics; 17-7
types,
auxiliary, characteristics; 17-10
effect of Copy command on; 20-3
effect of Cut command on; 20-2
effect of Paste command on; 20-5
system, characteristics; 17-10

observability,
controlling for,
pages; 24-13
substitution transitions; 24-12
mode attribute characteristics; 17-16
obtaining,
multisets,
random values from; 37-7
the number of elements in; 37-7
occlusion order,
term definition; 17-1, 3-19
occur,
term definition; 5-2
Occur button (Bind dialog, Sim menu),
invoking without displaying the dialog; 22-8
occurrence,
rule,
setting, with Occurrence Set Options command
(Set menu); 24-30
what happens when a transition occurs; 5-12
Occurrence Graph Analyzer,
reporting names not acceptable to,
with the Syntax Options command (Set menu);
24-20
Occurrence Set (Sim menu),
reference description; 22-9
Occurrence Set Options (Set menu),
examining and changing occurrence set parameters
with; 8-20
reference description; 24-29
occurrence sets,
See Also algorithms; bindings;
adding to; 22-9
calculation of,
setting, with Occurrence Set Options command
(Set menu); 24-29
clearing; 22-9
constructing; 8-18
for SalesNet model execution with conflict; 8-12
controlling the presence of,
pages in; 24-13
substitution transitions in; 24-12
defining,
with a single binding; 22-8
deleting; 22-9
editing area consistency; 22-4
Index

occurrence sets (cont’d),
  executing,
    algorithm for; 8-14
  the elements in; 8-13
  listing of bindings included in; 22-5
parameters,
  examining and changing; 8-20
  retaining; 22-8
  review of; 8-18
term definition; 8-11, 8-18

octal code string operation (ord),
  reference description; 32-8

of_id’ (membership) function,
  syntax and characteristics; 32-27

Omit Page Borders component (Page Setup command),
  reference description; 19-6

omitting,
  See Also deleting;
  time stamp; 12-8

Open (File menu),
  reference description; 19-2

Open Page (Page menu),
  moving nodes between pages with; 4-15
  reference description; 26-2
  selecting a page with; 6-4

opening,
  diagram; 1-4
  pages,
    with Open Page (Page menu); 26-2

operators and operations (cont’d),

operators and operations (cont’d),
  > (string greater than); 32-8
  >= (numeric greater than or equal); 32-8
  >= (string greater than or equal); 32-8
  >> (greater than); 41-3
  >>= (multiset greater than); 37-6
  >>= (greater than or equal); 41-3
  >>= (multiset greater than or equal); 37-6
  @ time stamp; 30-4, 39-4, 41-5
  \ (backslash); 32-8
  ` (backquote) multiset creation; 37-2, 41-3
  abs; 32-6
  absolute value (abs); 32-6
  addition (+); 32-6, 37-3
    reference description; 41-1
  arctan (arctangent); 32-6
  arctangent (arctan); 32-6
  backquote (‘) multiset creation; 2-8, 37-2
  backslash (\); 32-8
  binary,
    association rule; 36-5
    boolean,
      used in guards; 5-8
    chr (character-octal code) string; 32-8
    comparison,
      used in guards; 5-8
    concatenate list (^); 32-14
    concatenate string (^); 32-8
    cos (cosine); 32-6
    cosine (cos); 32-6
    division (÷); 32-6
    equal numeric (=); 32-8
    equal string (=); 32-8
    equality multiset (==); 37-5
      reference description; 41-2
    exp (exponential); 32-6
    exponential (exp); 32-6
    expressions; 36-3
      precedence; 36-4
    function type,
      association rule; 36-5
    greater than or equal numeric (>=); 32-8
    greater than or equal string (>=); 32-8
    greater than numeric (>); 32-8
    greater than string (>); 32-8
    greater than multiset (>>); 37-6
    greater than or equal multiset (>>=); 37-6
      reference description; 41-3
    less than or equal numeric (<=); 32-8
    less than or equal string (<=); 32-8
    less than numeric (<); 32-8
    less than string (<); 32-8

Design/CPN Reference Manual for the Macintosh IDX-41
operators and operations (cont’d),
less than multiset (<<); 37-6
less than or equal multiset (<<=); 37-6
reference description; 41-3
less than or equal multiset (<<=),
reference description; 41-3
list concatenation; 30-4
ln (natural logarithm); 32-6
mkst_col’; 32-8, 32-19
mkst_ms’: 32-8, 32-20
multiplication (*); 32-6
multiplying multisets; 37-4
multiset,
addition (+); 41-1
creation (’), reference description; 41-3
creation (‘), syntax and use; 37-2
equality (==); 41-2
greater than (>>); 41-3
greater than or equal (>>=); 41-3
less than (<<); 41-3
less than or equal (<<=); 41-3
not equal (<>); 41-2
scalar multiplication (*); 41-2
subtraction (-); 41-2
time append (@); 41-5
natural logarithm (ln); 32-6
negation (~); 32-6
not equal (<>),
reference description; 41-2
not equal multiset (<>), 37-5
not equal numeric (<>); 32-8
not equal string (<>); 32-8
octal code string (ord); 32-8
operation; 41-1
ord (octal code) string; 32-8
precedence and association (table); 36-5
predefined,
reference descriptions; 41-1
prepend list; 32-14
scalar multiplication (*); 37-4, 41-2, 41-7
sin (sine); 32-6
sine (sin); 32-6
size string; 32-8
sqrt (square root); 32-6
square root (sqrt); 32-6
subtraction (-); 32-6, 37-4, 41-7
reference description; 41-2
tan (tangent); 32-6
tangent (tan); 32-6
term definition; 41-1
time append (@); 41-5

option key,
navigating in text mode with; 17-3
options,
model,
characteristics and commands that access; 17-17
term definition; 17-15, 17-17
ord (octal code) string operation,
reference description; 32-8
ord’ (ordinal number) function,
syntax and characteristics; 32-22
order occlusion,
for connectors; 17-1
for regions; 17-1
on a page; 17-1
term definition; 17-1
ordering,
colorsets; 32-28
ordinal number (ord’) function,
syntax and characteristics; 32-22
orelse (boolean disjunction),
expression specifier use; 36-2
orelse (boolean OR),
boolean operator used in guards; 5-8
origin,
line charts,
specifying; 21-16
original parent object,
term definition and characteristics; 17-5
output,
keyword,
code segment output clause identified by; 40-18
term definition; 13-2
multiset,
term definition; 5-14
pattern,
code segment, term definition and characteristics;
13-2
place,
term definition; 2-13
port,
characteristics; 21-24
token regions,
characteristics; 17-11
removing; 21-27
output arcs,
bounding CPN variables on; 13-1
inscriptions,
appending time delays to; 40-6
characteristics as CP net component; 2-1
conditional; 40-6
delay expressions on; 12-8
evaluating; 5-14
output arcs (cont’d),
  inscriptions (cont’d),
    examples; 40-13
    free variables on, uses and cautions; 40-5
    function application use and restrictions; 40-6
    functions permitted with, with_code; 41-6
    functions permitted with, with_time; 41-6
    if/then/else use in; 38-2
    term definition; 2-14
    timing considerations; 39-2
    term definition; 2-13
Output Form component (Page Setup command),
  reference description; 19-6
output_col function,
  reference description; 41-8
output_ms function,
  reference description; 41-8
  syntax and characteristics; 37-9
output_tms function,
  reference description; 41-8
overflow,
  line charts,
    specifying methods for handling; 21-17
overloading,
  CPN ML feature; 30-1

P

Page Attributes (Set menu),
  naming pages with; 4-14
  reference description; 24-10
page kind (page attribute),
  characteristics; 17-15
Page menu,
  See Also menus;
    Blowup command; 26-2
    Cleanup command; 26-3
    Close Page command; 26-2
    commands reference (chapter); 26-1
    New Page command; 26-2
      creating a page for global declarations with; 4-14
    Open Page command; 26-2
      moving nodes between pages with; 4-15
      selecting a page with; 6-4
    Redraw Hierarchy command; 26-3
      redrawing the hierarchy page with; 11-14
    Reduce command; 26-3
    Scroll command; 26-2
Page Preview (File menu),
  reference description; 19-5

Page Setup (File menu),
  reference description; 19-6
pages,
  attributes,
    changing; 24-10
    changing system and/or diagram defaults; 24-12
    term definition and components; 17-15
  borders,
    changing the size; 24-11
    rendering visible or invisible; 24-11
    visibility, characteristics; 17-15
  characteristics and components; 1-5
  cleaning up,
    with Cleanup (Page menu); 26-3
  closing,
    with Close Page (Page menu); 26-2
  connectors,
    deletion requirements; 20-6
  creating,
    with New Page (Page menu); 26-2
  enlarging,
    with Blowup (Page menu); 26-2
  fusion place,
    term definition; 10-10
  fusion sets,
    creating; 10-9
    term definition; 10-9
  fusion subsets,
    term definition; 10-10
  hierarchy,
    changing the layout and redrawing options; 24-15
    for a hierarchical CP net diagram; 11-2
    moving detail to a subpage of with Move to Subpage command (CPN menu); 21-17
    renaming pages from; 4-14
  instances,
    creating; 10-11
    displaying name of; 22-12
    specifying the number of; 24-13
    switching among; 22-12
    term definition; 10-11
  master,
    creating; 24-10
  mode,
    changing; 24-13
  moving,
    nodes and groups to; 25-7
    nodes to a different; 4-15
  names,
    duplicate, reporting with the Syntax Options command (Set menu); 24-20
pages (cont’d),
names (cont’d),
  ML-illegal, reporting with the Syntax Options command (Set menu); 24-20
term definition; 17-20
naming,
  with Page Attributes (Set menu); 4-14
navigating,
  among; 1-5
to, from a hierarchy page node; 17-3
nodes,
  characteristics; 1-5, 17-10
deletion requirements; 20-6
navigating to a page from; 17-3
numbers,
specifying pages to print with; 1-6
term definition; 17-20
occlusion order on; 17-1
occurrence set contribution,
  specifying, with Occurrence Set Options command (Set menu); 24-29
opening,
  with Open Page (Page menu); 26-2
overlay options,
  changing; 24-15
Page Menu commands reference,
  (chapter); 26-1
page mode key region,
term definition; 6-5
page mode region,
term definition; 6-5
palette,
  changing overlay options; 24-15
  creating; 24-10
  using; 24-11
prime,
  designating; 6-4
  specifying; 24-13
redrawing diagrams,
  with Cleanup (Page menu); 26-3
reference variables,
syntax and characteristics; 35-3
relationship in a hierarchy; 11-21
renaming,
  from the hierarchy page; 4-14
scrolling,
  with Scroll (Page menu); 26-2
size,
  characteristics; 17-15
  enlarging, with Blowup (Page menu); 26-2
  reducing, with Reduce (Page menu); 26-3
specifying occurrence set contribution; 24-30
pages (cont’d),
tags,
deletion requirements; 20-6
term definition and characteristics; 17-5
palette pages,
  creating; 24-10
  overlay options, changing; 24-15
  using; 24-11
Parent Object (Makeup menu),
  navigating with; 17-4
parentheses (())
  guards use of; 5-9
parents,
  See Also regions;
deleting; 3-17
locking regions relative to,
  with Size component (Region Attributes command-Set menu); 24-9
moving; 3-17
operations performed on auxiliary regions effect on; 23-11
selecting,
  with Parent Object (Makeup menu); 25-10
term definition and characteristics; 3-16, 17-5
unlocking regions relative to,
  with Size component (Region Attributes command-Set menu); 24-9
parts (charts),
  term definition; 15-2
Paste (Edit menu),
  reference description; 20-5
pasting,
  bar charts; 15-13
  history charts; 15-17
  line charts; 15-31
patterns,
  characteristics and use; 36-6
  lists; 40-11
  records,
    input arc inscription example; 40-11
  tuples,
    input arc inscription example; 40-10
  term definition and characteristics; 2-6
performing,
  See Also executing;
syntax check; 6-1
perimeter transitions,
  creating when moving detail to a subpage,
    with Move to Subpage command (CPN menu); 21-17
perimeter transitions (cont’d),
  term definition; 21-17
Petri nets,
  See CP nets; Design/CPN;
Picture (Aux menu),
  reference description; 23-9
pictures,
  creating, modifying, and moving; 23-9
  resizing,
    with same aspect ration; 23-9
  shape attributes,
    changing; 24-6
Place (CPN menu),
  reference description; 21-2
places,
  See Also colorsets; CPN objects, classes of; ellipses;
    initial markings;
  adding to fusion sets,
    with Fusion Place command (CPN menu); 21-22
  changing size and position; 21-2
  characteristics,
    and regions; 17-8
    and term definition; 2-10
    as CP net component; 2-1
  colorset region,
    syntax and characteristics; 40-3
  creating,
    multiple; 21-2
    with Place (CPN menu); 4-7
  current marking simulation regions,
    characteristics; 6-14
  fusion,
    (chapter); 10-1
    changing the type of, with Fusion Place command
      (CPN menu); 21-21
    creating, with Fusion Place command (CPN menu);
      21-20
    global, physical appearance; 10-5
  global, term definition; 10-5
  instance, changing the type of, with Fusion Place
    command (CPN menu); 21-21
  instance, renaming, with Fusion Place command
    (CPN menu); 21-21
  instance, term definition; 10-13
  multiple pages; 10-8
  page, changing the type of, with Fusion Place
    command (CPN menu); 21-21
  page, renaming, with Fusion Place command (CPN
    menu); 21-21
  page, term definition; 10-10
  renaming, with Fusion Place command (CPN
    menu); 21-21
places (cont’d),
  fusion (cont’d),
    single page; 10-3
    term definition; 10-1
    turning non-fusion places; 21-23
  initial marking region,
    syntax and characteristics; 40-3
  input,
    term definition; 2-13
  markings,
    changing, with Change Marking command (Sim
      menu); 22-11
    term definition and characteristics; 2-11
  moving between fusion sets; 21-23
  name region,
    syntax and characteristics; 40-2
  names,
    changing; 17-21
    creating from auxiliary regions; 23-13
    duplicate, reporting with the Syntax Options
      command (Set menu); 24-19
    entering; 17-21
    missing, reporting with the Syntax Options
      command (Set menu); 24-19
    ML-illegal, reporting with the Syntax Options
      command (Set menu); 24-19
    term definition; 17-20
  naming,
    with CPN Region (CPN menu); 4-7
  output,
    term definition; 2-13
  place creation mode,
    term definition; 4-7
  place tool,
    term definition and illustration; 4-7
  port,
    assigning with Port Assignment command (CPN
      menu); 21-24
    creating when moving detail to a subpage with
      Move to Subpage command (CPN menu); 21-17
    creating with Port Place command (CPN menu);
      21-23
    deletion requirements; 20-6
    effect of Replace by Subpage command (CPN
      menu) on; 21-19
    general, characteristics; 21-24
    term definition; 21-18
  regions,
    creating; 21-5
    creating from auxiliary regions; 23-13
    removing from fusion sets; 10-7
places (cont’d),
socket,
effect of Replace by Subpage command (CPN menu) on; 21-19
term definition; 21-18
with Move to Subpage command (CPN menu) creating when moving detail to a subpage; 21-17
subtracting from fusion sets,
with Fusion Place command (CPN menu); 21-22
terminating creation mode; 21-2
text use in; 21-2
pointer tool,
characteristics and illustration; 3-16
pointer variables,
See reference variables;
polar coordinates,
aligning nodes relative to,
with Position (Align menu); 29-3
Polygon (Aux menu),
reference description; 23-5
polygons,
creating, modifying, and moving; 23-5
shape attributes,
changing; 24-7
popup regions,
term definition and characteristics; 6-15, 17-11
Port Assignment (CPN menu),
manually assigning ports to sockets with; 11-27
reference description; 21-24
Port Place (CPN menu),
reference description; 21-23
ports,
assignments,
impact on the results of the Change Marking command (Sim menu); 22-11
effect of duplication on; 25-6
input,
characteristics; 21-24
input/output,
characteristics; 21-24
manually assigning to sockets; 11-25
navigating from a subpage to a superpage by double-clicking on; 11-5
output,
characteristics; 21-24
places,
assigning; 21-24
creating; 21-23
creating when moving detail to a subpage; 21-17
deleting assignments; 21-25
deletion requirements; 20-6
ports (cont’d),
places (cont’d),
effect of moving nodes between pages on; 25-8
effect of Replace by Subpage command (CPN menu) on; 21-19
general characteristics; 21-24
navigating to a superpage from; 17-3
term definition; 21-18
types of; 21-24
port key region,
term definition; 11-4
regions,
CPN Region command restricted from creating; 21-5
term definition; 11-4
socket relationship to; 11-4
term definition; 11-1
position,
nodes,
changing; 21-8
places,
changing; 21-2
regions,
changing; 24-9
transitions,
changing; 21-3
Position (Align menu),
reference description; 29-3
power commands,
keys and shortcuts,
(chapter); A-1
precedence,
operators,
expression evaluation; 36-4
preference,
characteristics and components; 17-15
prepend,
characteristics and components; 17-15
preserving,
See aligning;
Previous Object (Makeup menu),
navigating with; 17-4
reference description; 25-11
prime,
term definition; 17-16
prime pages,
See Also occurrence sets; simulation;
characteristics; 17-16
designating; 6-4
specifying; 24-13
term definition; 6-4
Index

Print (File menu),
reference description; 19-7
Print Hierarchy Page component (Page Setup command),
reference description; 19-6
printing,
diagram; 1-6
overlapping objects,
specifying the; 24-4
page borders,
rendering visible or invisible; 24-11
products,
See tuples;
projecting,
a line of nodes,
with Projection (Align menu); 29-5
Projection (Align menu),
reference description; 29-5
proposed occurrence sets (mode attribute),
characteristics; 17-16
reading (cont’d),
multisets (cont’d),
timed, with input_tms function; 41-8
with input_ms function; 41-5, 41-8
real numbers,
See Also colorsets;
colorsets,
ordering of; 32-28
syntax and characteristics; 32-5
testing for membership in; 32-26
functions,
standard ML, list of supported; 41-10
operations predefined for; 32-6
value identifiers,
declaring; 33-2
realtime,
functions,
standard ML, list of supported; 41-12
reattaching,
connectors; 23-2
rebinding,
See bindings; CPN variables;
reconstructing,
groups; 3-21
recording,
results of simulation,
adding information, with write_report function; 6-11
specification with General Simulation Options (Set menu); 6-10
records,
See Also colorsets;
colorsets,
constructing multiset for; 32-25
ordering of; 32-28
syntax and characteristics; 32-11
expression constructors; 36-3
multiplying multisets of; 37-5, 41-2
patterns,
input arc inscription example; 40-11
selector functions; 32-12
specifying in expressions; 36-2
rectangles,
See Also transitions;
adding text to; 3-9
creating; 3-5
a series of; 3-9
adding text while; 3-9
deleting; 3-8
moving; 3-8
during creation; 3-8
preserving the aspect ratio during size change; 3-10
random values,
obtaining from a multiset,
with random function; 41-4
ran’ (random value) function,
arc inscriptions not permitted to use; 40-5
guards not permitted to use; 40-16
reference description; 41-4
syntax and characteristics; 32-18, 37-7
time region use; 40-15
union colorset selector use; 32-16
random number generation,
setting seed value for, with Occurrence Set Options command (Set menu); 24-31
quit.
See Also entering;
Design/CPN; 1-7
quit,
reference description; 19-13
putting,
See Also colorsets;
putting, moving;
with input_col function; 41-8
multisets; 37-9
ran’ (random value) function,
arc inscriptions not permitted to use; 40-5
guards not permitted to use; 40-16
reference description; 41-4
syntax and characteristics; 32-18, 37-7
time region use; 40-15
union colorset selector use; 32-16
random number generation,
setting seed value for, with Occurrence Set Options command (Set menu); 24-31
reading,
See Also colorsets;
colorsets,
with input_col function; 41-8
multisets; 37-9
rectangles,
See Also transitions;
adding text to; 3-9
creating; 3-5
a series of; 3-9
adding text while; 3-9
deleting; 3-8
moving; 3-8
during creation; 3-8
preserving the aspect ratio during size change; 3-10
random values,
obtaining from a multiset,
with random function; 41-4
ran’ (random value) function,
arc inscriptions not permitted to use; 40-5
guards not permitted to use; 40-16
reference description; 41-4
syntax and characteristics; 32-18, 37-7
time region use; 40-15
union colorset selector use; 32-16
random number generation,
setting seed value for, with Occurrence Set Options command (Set menu); 24-31
reading,
See Also colorsets;
colorsets,
with input_col function; 41-8
multisets; 37-9
rectangles,
See Also transitions;
adding text to; 3-9
creating; 3-5
a series of; 3-9
adding text while; 3-9
deleting; 3-8
moving; 3-8
during creation; 3-8
preserving the aspect ratio during size change; 3-10
random values,
obtaining from a multiset,
with random function; 41-4
ran’ (random value) function,
arc inscriptions not permitted to use; 40-5
guards not permitted to use; 40-16
reference description; 41-4
syntax and characteristics; 32-18, 37-7
time region use; 40-15
union colorset selector use; 32-16
random number generation,
setting seed value for, with Occurrence Set Options command (Set menu); 24-31
reading,
See Also colorsets;
colorsets,
with input_col function; 41-8
multisets; 37-9
rectangles,
See Also transitions;
adding text to; 3-9
creating; 3-5
a series of; 3-9
adding text while; 3-9
deleting; 3-8
moving; 3-8
during creation; 3-8
preserving the aspect ratio during size change; 3-10
random values,
obtaining from a multiset,
with random function; 41-4
ran’ (random value) function,
arc inscriptions not permitted to use; 40-5
guards not permitted to use; 40-16
reference description; 41-4
syntax and characteristics; 32-18, 37-7
time region use; 40-15
union colorset selector use; 32-16
random number generation,
setting seed value for, with Occurrence Set Options command (Set menu); 24-31
reading,
See Also colorsets;
colorsets,
with input_col function; 41-8
multisets; 37-9
rectangles,
See Also transitions;
adding text to; 3-9
creating; 3-5
a series of; 3-9
adding text while; 3-9
deleting; 3-8
moving; 3-8
during creation; 3-8
preserving the aspect ratio during size change; 3-10
random values,
obtaining from a multiset,
with random function; 41-4
ran’ (random value) function,
arc inscriptions not permitted to use; 40-5
guards not permitted to use; 40-16
reference description; 41-4
syntax and characteristics; 32-18, 37-7
time region use; 40-15
union colorset selector use; 32-16
random number generation,
setting seed value for, with Occurrence Set Options command (Set menu); 24-31
reading,
See Also colorsets;
colorsets,
with input_col function; 41-8
multisets; 37-9
rectangles,
Design/CPN Tutorial

rectangles (cont’d),
rectangle creation mode,
characteristics; 3-6
rectangle tool,
characteristics and illustration; 3-6
reshaping; 3-7
redefining,
bar chart attributes; 15-7
history charts; 15-16
line charts; 15-23
Redo (Edit menu),
reference description; 20-2
Redraw Hierarchy (Page menu),
redrawing the hierarchy page with; 11-14
reference description; 26-3
redrawing,
hierarchy page,
with Redraw Hierarchy (Page menu); 26-3
pages,
with Cleanup (Page menu); 26-3
Reduce (Page menu),
See Also Blowup (Page menu);
reference description; 26-3
reducing,
pages,
with Reduce (Page menu); 26-3
reference,
functions,
standard ML, list of supported; 41-12
summaries,
(chapter); 17-1
reference variables,
(chapter); 35-1
arc inscriptions not permitted to use; 40-5
CPN,
global, syntax and characteristics; 35-3
instance, syntax and characteristics; 35-3
page, syntax and characteristics; 35-3
CPN ML extension; 30-3
denition and characteristics; 17-7
expression use and restrictions; 36-2
restrictions on use; 35-1
val-defined,
syntax and characteristics; 35-2
val-defined; 35-1
Region Attributes (Set menu),
reference description; 24-8
regions,
See Also CPN objects, classes of; nodes;
arc inscription,
term definition; 2-14
arc inscription region,
syntax and characteristics; 40-4
regions (cont’d),
arc; 17-9
attributes,
changing; 24-8
components; 17-15
auxiliary,
creating; 23-11
creating auxiliary nodes from; 23-12
creating code segments from; 23-13
creating CPN regions from; 23-12
creating from auxiliary regions; 23-13
creating from CPN regions; 23-14
creating guards from; 23-13
creating initial markings from; 23-13
creating log regions from; 23-13
creating place names from; 23-13
creating transition names from; 23-13
effect of Paste command on; 20-5
binding,
characteristics; 17-11
border,
deletion requirements; 20-6
changing,
with Change Shape command (Makeup menu);
25-6
charts; 17-9
bar, specifying; 21-11
history, specifying; 21-11
code,
creating; 21-6
deletion requirements; 20-6
color,
changing; 24-9
colorsets,
characteristics; 40-3
creating with CPN Region command; 21-5
creation mode, term definition; 4-8
converting into nodes; 3-17
copying; 4-11
CPN,
characteristics and relationships with parent
objects; 17-10
creating auxiliary regions from; 23-14
creating from auxiliary regions; 23-12
creating multiple; 21-6
effect of Paste command on; 20-5
place regions, creating; 21-5
terminating creation mode; 21-7
creating; 3-16
a group of; 27-2
### regions (cont'd),
- **current marking**, characteristics: 17-10
- removing with Remove Sim Regions command (CPN menu): 21-27
- **displaying**, with Show Regions (Makeup menu): 25-9
- **duplicating**, with Duplicate Node command (Makeup menu): 25-6
- **editing**: 3-17
  - editor, changing the visibility of: 17-3
  - editor key/popup, list: 17-12
  - effect of, Child Object (Makeup menu) on: 25-11
  - Copy command on: 20-4
  - Cut command on: 20-2
  - merging nodes on: 25-8
  - moving nodes between pages on: 25-7
- **endpoint**, characteristics: 17-11
  - creating: 17-14
  - term definition and characteristics: 17-13
- **feedback**, removing with Remove Sim Regions command (CPN menu): 21-27
- **fusion**, CPN Region command restricted from creating: 21-5
  - deletion requirements: 20-6
  - key region, term definition and illustration: 10-6
  - term definition: 10-6
- **guard**, creating: 21-6
- **hidden**, selecting with arrow keys: 25-9
- **hiding**, with Hide Regions (Makeup menu): 25-9
- **hierarchy**, CPN Region command restricted from creating: 21-5
  - creating when moving detail to a subpage with Move to Subpage command (CPN menu): 21-18
  - deletion requirements: 20-6
  - key region, term definition: 11-8
  - term definition: 11-8
- **initial marking**, creating with CPN Region command: 21-5
  - syntax and characteristics: 40-3
  - term definition and characteristics: 2-12
### regions (cont'd),
- **input token**, characteristics: 17-11
  - removing with Remove Sim Regions command (CPN menu): 21-27
- **inscription**, See inscriptions; specific names;
- **key**, editor, creating and deleting: 17-13
  - simulator, creating and deleting: 17-13
  - term definition and characteristics: 17-7, 17-11
- **layering order for**: 17-1
- **line charts**: 21-15
- **locking relative to the parent**, with Size component (Region Attributes command-Set menu): 24-9
- **log**, characteristics and use: 13-3
  - creating: 21-6
- **mode**, characteristics: 17-10
  - deletion requirements: 20-6
  - moving: 11-10
    - the parent of: 3-17
  - name, creating: 21-6
  - output token, characteristics: 17-11
    - removing with Remove Sim Regions command (CPN menu): 21-27
  - places: 17-8
    - creating: 21-5
  - name, syntax and characteristics: 40-2
  - popup, changing: 24-9
    - term definition and characteristics: 17-11
- **port**, CPN Region command restricted from creating: 21-5
  - key, term definition: 11-4
  - term definition: 11-4
- **position**, changing: 24-9
- **region tool**, term definition and illustration: 4-6
  - resizing, without moving the center, with Adjust command (Makeup menu): 25-4
  - selecting: 11-10
  - shapes possible to: 24-5
  - simulation, changing the visibility of: 17-3
regions (cont’d),
  simulation (cont’d),
  characteristics and purpose; 6-13
  key/popup, list; 17-12
  removing with Remove Sim Regions command
  (CPN menu); 6-19, 21-27
size,
  changing; 24-9
substitution tag,
  term definition; 11-2
system,
  characteristics; 17-10
  term definition and characteristics; 3-16, 17-5
time,
  assigning time stamps with CPN Region (CPN
  menu); 12-10
  creating; 21-6
  creating from auxiliary regions; 23-13
  term definition; 12-7
transitions; 17-8
  creating; 21-6
  feedback, characteristics; 17-11
  reference description; 40-14
  time region; 39-3
unlocking relative to the parent,
  with Size component (Region Attributes
  command-Set menu); 24-9
Regular Polygon (Aux menu),
  reference description; 23-7
relational,
  expression operators; 36-3
Remove Sim Regions (CPN menu),
  reference description; 21-27
  removing simulation regions with; 6-19
removing,
  See Also creating;
  simulation regions,
    with Remove Sim Regions command (CPN menu);
    6-19
renaming,
  fusion places,
    with Fusion Place command (CPN menu); 21-21
  instance fusion places,
    with Fusion Place command (CPN menu); 21-21
  page fusion places,
    with Fusion Place command (CPN menu); 21-21
  pages,
    from the hierarchy page; 4-14
rendering,
  objects invisible; 24-4
Replace by Subpage (CPN menu),
  reference description; 21-19
replacing,
  substitution transition with subpage,
    using the Replace by Subpage command (CPN
    menu); 21-19
text,
  in a group, with Find (Text menu); 28-4
  with Find (Text menu); 28-3
reports,
  simulation,
    clearing, with Save Report command (Sim menu);
    22-13
    customizing, with the Simulation Code Options
    command (Set menu); 24-27
    naming, with Save Report command (Sim menu);
    22-13
    saving, with Save Report command (Sim menu);
    22-13
    specifying, with the Simulation Code Options
    command (Set menu); 24-25
writing,
  with write_report function; 41-6
repositioning,
  groups,
    with Align menu commands; 29-2
  nodes,
    with Align menu commands; 29-1
  objects,
    with Displace command (Makeup menu); 25-4
    with Drag command (Makeup menu); 25-2
representation,
  concurrency; 8-2
  conflict; 8-5
  multisets,
    internal; 37-9
  state,
    transition use as; 8-3
  time,
    simulated (chapter); 12-1
rerouting,
  See Also aligning;
  arcs; 11-9
reserved words,
  CPN ML; 31-2
resetting,
  drawing environment; 3-5
reshaping,
  See Also aligning; creating;
  rectangles; 3-7
resizing,
  labels,
    without moving the center, with Adjust command
    (Makeup menu); 25-4
resizing (cont’d),
  nodes,
    with Change Shape command (Makeup menu);
      25-5
  objects,
    with Change Shape command (Makeup menu);
      25-5
  without moving the center, with Adjust command
    (Makeup menu); 25-4
  pictures,
    with same aspect ration; 23-9
  regions,
    without moving the center, with Adjust command
    (Makeup menu); 25-4
  ResmodSubtrans model,
    hierarchy page; 11-2
    subpage; 11-3
    superpage; 11-3
  Resource Use Model,
    data; 16-2
    description; 10-1
    executing; 10-3
    graphics and global declarations; 16-3
    improvement suggestions; 16-15
    introduction and overview; 16-1
    running the model; 16-4
  resources,
    allocation of; 8-1
    competition for,
      as concurrency problem; 8-1
  restarting,
    simulation after breakpoint or interruption by Stop
    command; 22-10
  restoring,
    drawing environment; 3-5
  Reswitch (Sim menu),
    reference description; 22-13
    reswitching SalesNet after changing in the simulator;
      8-10
  reswitching,
    after changing a CP net in the simulator; 8-10
    diagrams,
      with Reswitch command (Sim menu); 22-13
  retaining,
    occurrence set; 22-8
  Revert (File menu),
    reference description; 19-5
  Right to Left (Align menu),
    reference description; 29-6
  Right to Right (Align menu),
    reference description; 29-6
  rot’ (rotation) function,
    syntax and characteristics; 32-24
  rotation (rot’) function,
    syntax and characteristics; 32-24
  rounded,
    boxes,
      changing shape attributes; 24-6
    creation and manipulation; 23-4
    polygons,
      creation and manipulation; 23-7
  Rounded Box (Aux menu),
    reference description; 23-4
  routing,
    See Also aligning;
    See Horizontal (Align menu); Vertical (Align
    menu);
  running,
    See executing;
  runtime environment,
    ML (chapter); 41-1

S

  SalesNet model,
    changing in the simulator; 8-9
    concurrent execution of; 8-7
    executing with conflict; 8-12
  satisfy,
    term definition; 5-10
  Save (File menu),
    reference description; 19-3
  Save As (File menu),
    reference description; 19-5
  Save Report (Sim menu),
    reference description; 22-13
  Save State (File menu),
    reference description; 19-10
    saving execution states with; 5-15
  Save Subdiagram (File menu),
    reference description; 19-7
  Save Text (File menu),
    reference description; 19-8
  saved states,
    entering the simulator with; 6-12
    loading with Open command (File menu); 19-11
    opening; 19-2
    term definition; 5-15
saving,
See Also loading;
bar chart copy; 21-12
exection states,
with Save State (File menu); 5-15
history chart copy; 21-12
line charts; 21-15
simulation reports,
with Save Report command (Sim menu); 22-13

scalar multiplication operator (*),
function scalar multiplication; 41-7
multiplying multisets; 37-4
scalar multiplication of multisets with; 41-2

scope,
local,
declaring local variables within a function; 38-1
term definition; 34-1

scoping,
static,
CPN ML feature; 30-2

Scroll (Page menu),
reference description; 26-2

scrolling,
autoscrolling characteristics; 3-4
display options,
changing; 24-15
pages,
with Scroll (Page menu); 26-2

searching for,
text,
in a group, with Find (Text menu); 28-4
with Find (Text menu); 28-3

segments,
term definition; 3-14

Select (Makeup menu),
accessing difficult to select objects with; 17-4
reference description; 25-2

Select All Connectors (Group menu),
reference description; 27-2

Select All Nodes (Group menu),
reference description; 27-2

Select All Regions (Group menu),
reference description; 27-2

Select All Text (Text menu),
reference description; 28-5

Select Fusion Set (Group menu),
reference description; 27-3

Select Instance (Sim menu),
reference description; 22-12

Select to (Text menu),
reference description; 28-5

Select to Bracket (Text menu),
reference description; 28-5

Select to Bracket command,
specifying brackets and character counts used by,
with Text Options command (Set menu); 24-17

selectability (graphical attribute),
changing; 17-17
characteristics; 17-17

selectable,
term definition; 17-17

selecting,
all nodes,
with Select All Nodes (Group menu); 27-2
child objects,
with Child Object (Makeup menu); 25-10
fusion sets,
with Select Fusion Set (Group menu); 27-3
graphical objects; 3-18
hidden regions,
with arrow keys; 25-9
objects,
the next object in the layering order, with Next Object (Makeup menu); 25-11
the previous object in the layering order, with Previous Object (Makeup menu); 25-11
with Select command (Makeup menu); 25-2
parents,
with Parent Object (Makeup menu); 25-10
regions; 11-10
simulation type of,
with General Simulation Options (Set menu); 6-8
text,
with Select All Text (Text menu); 28-5
with Select to (Text menu); 28-5
with Select to Bracket (Text menu); 28-5

selectors,
boolean; 41-6
expression operators; 36-3
selector functions,
records; 32-12
union colorsets,
specifying; 32-16

Set menu,
See Also menus;
Chart Attributes command; 24-14
commands reference (chapter); 24-1
Copy Defaults command; 24-34
copying diagram defaults with; 4-3
General Simulation Options command; 24-23
selecting the type of simulation with; 6-8
selecting the termination conditions with; 6-9
Graphic Attributes command; 24-3
Index

Set menu (cont’d),
  Hierarchy Page Options command; 24-15
  Interaction Options command; 24-15
  Interactive Simulation Options command; 24-27
    setting breakpoints with; 6-16
  Merge Options command; 24-16
  ML Configuration Options command; 24-32
  Mode Attributes command; 24-12
    creating multiple page instances with; 10-11
    designating prime pages with; 6-4
  Occurrence Set Options command; 24-29
    examining and changing occurrence set parameters
    with; 8-20
  Page Attributes command; 24-10
    naming pages with; 4-14
  Region Attributes command; 24-8
  Shape Attributes command; 24-5
  Simulation Code Options command; 24-21
    generating code for different types of execution
    with; 6-6
  Syntax Options command; 24-18
  Text Attributes command; 24-2
  Text Options command; 24-17
  Transition Feedback Options command; 24-31
sets,
  See also multisets;
setting,
  breakpoints,
    all, with Option key plus Stop command (Sim menu); 22-11
    with Interactive Simulation Options command (Set menu); 24-27
    with Interactive Simulation Options command (Set menu); 6-16
  graphical environment; 4-2
shape,
  attributes,
    changing; 24-5
    components; 17-15
  changing,
    with Change Shape command (Makeup menu); 25-5
Shape Attributes (Set menu),
  reference description; 24-5
shift key,
  navigating in text mode with; 17-3
Shift-DownArrow keys,
  navigating to an error with; 7-4
Show Regions (Makeup menu),
  reference description; 25-9
showing,
  regions,
    with Show Regions (Makeup menu); 25-9
side effects,
  arc inscriptions not permitted to have; 40-5
  CPN ML restrictions on the use of; 30-4
Sim menu,
  See also menus;
    Automatic Run command; 22-10
    Bind command; 22-2
    Change Marking command; 22-11
    Clear Report command; 22-13
    commands reference (chapter); 22-1
    Continue command; 22-10
      continuing execution after a breakpoint with;
      6-17, 8-15
    Initial State command; 22-12
      initializing SalesNet after changing in the simulator; 8-10
      initializing the CP net state with; 6-18
    Interactive Run command; 22-10
      constructing an occurrence set with; 8-12
      executing CP nets with; 6-17
    Occurrence Set command; 22-9
    Reswitch command; 22-13
      reswitching SalesNet after changing in the simulator; 8-10
    Save Report command; 22-13
    Select Instance command; 22-12
    Start Step command; 22-9
    Stop command; 22-11
    Update Chart command; 22-13
      updating bar charts with; 15-10
      updating line charts with; 15-27
simple,
  See also colorsets - boolean, enumerated values,
    indexed values, integers, real numbers, strings,
    unit;
  colorsets;
    characteristics; 32-2
    expressions,
      term definition; 36-1
simplifying,
  See aligning;
simulation,
  See also breakpoints;
  automatic,
    initiating with Automatic Run command (Sim menu); 22-10
    controlling the presence of,
      pages during; 24-13
**Design/CPN Tutorial**

**Simulation (cont’d),**
- controlling the presence of (cont’d), 24-12
- substitution transitions during, 24-12
- generating code for different types of,
  - with Simulation Code Options (Set menu); 6-6
- interactive,
  - initiating with Interactive Run command (Sim menu); 22-10
- managing,
  - with write_report and stop_simulation functions; 41-6
- options,
  - specifying with with_time and with_code functions; 41-6
  - testing for the with time option; 39-4
- recording results of,
  - adding information, with write_report function; 6-11
  - specification with General Simulation Options (Set menu); 6-10
- regions,
  - characteristics and purpose; 6-13
  - current marking; 6-14
  - feedback; 6-15
  - removing, with Remove Sim Regions command (CPN menu); 6-19
  - term definition; 6-14
  - transition feedback; 6-15
- reports,
  - clearing, with Save Report command (Sim menu); 22-13
  - naming, with Save Report command (Sim menu); 22-13
  - saving, with Save Report command (Sim menu); 22-13
  - specifying, with the Simulation Code Options command (Set menu); 24-25
- restarting after breakpoint or interruption by Stop command; 22-10
- selecting the type of,
  - with General Simulation Options (Set menu); 6-8
- specifying,
  - parameters for; 24-23
  - prime pages; 24-13
  - time for; 12-4
- step,
  - starting; 22-9
- stopping,
  - specifying criteria for, with the Simulation Code Options command (Set menu); 24-25
  - with Stop command (Sim menu); 22-11
  - with stop_simulation function; 41-6

**Simulation (cont’d),**
- term definition; 1-1
- termination,
  - specifying conditions for, with General Simulation Options (Set menu); 6-9
- type of,
  - specifying, with General Simulation Options command (Set menu); 24-24
  - with and without code,
    - code segment characteristics, syntax, and use; 13-1
    - specifying, with General Simulation Options command (Set menu); 24-24
    - with and without time, 12-14
    - mechanism; 12-3
    - specifying, with General Simulation Options command (Set menu); 24-24
    - with instance fusion sets; 10-14
    - writing a report on status of,
      - with write_report function; 41-6

**Simulation Code Options (Set menu),**
- generating code for different types of execution with; 6-6
- reference description; 24-21

**Simulator,**
- changing a net in; 8-9
- code options,
  - specifying which to use, with the Simulation Code Options command (Set menu); 24-21
  - entering; 6-12
  - with a saved state; 6-12
  - executing CP nets with,
    - (chapter); 6-1
    - execution algorithm; 8-11
    - illustrating with SalesNet model execution with conflict; 8-12
    - key/popup regions,
      - creating and deleting; 17-13
      - list; 17-12
    - leaving,
      - with Enter Editor command (File menu); 6-19
      - command that access; 17-17
      - overview; 5-1
    - regions,
      - changing the visibility of; 17-3
      - removing with Remove Sim Regions command (CPN menu); 21-27
      - role in mapping inputs to outputs; 8-3

**Sin operation (sine),**
- reference description; 32-6
**sine operation** *(sin)*,
reference description; 32-6

**single quote** *(‘)*,
type variable use; 30-4

**size**,  
colorsets,  
as classification dimension; 32-1
multiset,  
obtaining, with size function; 41-3
nodes,  
changing; 21-8

**pages**,  
borders, changing; 24-11
characteristics of page attribute; 17-15
enlarging, with Blowup (Page menu); 26-2
reducing, with Reduce (Page menu); 26-3

**places**,  
changing; 21-2
rectangle,  
preserving the aspect ratio while changing; 3-10

**regions**,  
changing; 24-9
size constant,  
syntax and characteristics; 32-21
size function,  
reference description; 41-3
syntax and characteristics; 37-7
size string operation,  
reference description; 32-8

**transitions**,  
changing; 21-3

**small colorsets**,  
See colorsets, small;

**snapshots**,  
creating, modifying, and moving; 23-9

**socket places**,  
creating when moving detail to a subpage,  
with Move to Subpage command (CPN menu); 21-17
effect of Replace by Subpage command (CPN menu)  
on; 21-19
term definition; 21-18

**sockets**,  
deletion requirements; 20-6
manually assigning ports to; 11-25
port relationship to; 11-4
term definition; 11-1

**spacing**,  
nodes,  
along a diagonal, See Vertical Spread (Align menu)  
and Horizontal Spread (Align menu);

**spreading** *(cont’d)*,  
nodes *(cont’d)*,  
equidistantly around a circle, with Circular Spread  
(Align menu); 29-5
vertically, with Vertical Spread (Align menu); 29-5

**specifying**,  
bar charts,  
bar names; 21-11
grid lines; 21-11	
title; 21-11
code generation for,  
code segments; 24-21
simulation type; 24-21
timed simulation; 24-22
colorsets,  
with CPN Region (CPN menu); 4-8

**graphics updating during simulation**,  
with Interactive Simulation Options command (Set menu); 24-28

**history charts**,  
bar names; 21-11
grid lines; 21-11	
title; 21-11
values; 15-16
initial marking,  
with CPN Region (CPN menu); 4-9

**input arc inscriptions**,  
with CPN variables; 5-7

**line charts**,  
grid lines, characteristics; 21-15
lines, characteristics; 21-14
methods for handling overflow; 21-17
name; 21-14
origin; 21-16
regions; 21-15
values, the type and range; 21-16

**ML configuration options**,  
with ML Configuration Options command (Set menu); 24-32

**multisets**; 2-8

**number of pages instances**; 24-13

**occurrence set parameters**,  
with Occurrence Set Options command (Set menu); 24-29

**options**,  
merging arcs; 24-17
merging connectors; 24-17
merging nodes; 24-16
Design/CPN Tutorial

specifying (cont’d),
options (cont’d),
  merging text in CPN regions; 24-17
  merging text in nodes; 24-17
overlapping object display and printing; 24-4
prime page; 6-4, 24-13
simulation parameters,
  with the General Simulation Options command
    (Set menu); 24-23
text brackets used by Load Text and Select to Brackets
  commands,
    with Text Options command (Set menu); 24-17
tokens,
  exact values with constants; 5-4
  multiple tokens with the different values; 5-6
  multiple tokens with the same value; 5-5
  with CPN variables; 5-7
spreading,
  See Also aligning;
  nodes,
    along a diagonal, See Vertical Spread (Align menu)
      and Horizontal Spread (Align menu);
    equidistantly around a circle, with Circular Spread
      (Align menu); 29-5
    horizontally, with Horizontal Spread (Align menu);
      29-4
    vertically, with Vertical Spread (Align menu);
      29-5
sqrt operation (square root),
  reference description; 32-6
square root operation (sqrt),
  reference description; 32-6
standard defaults,
  term definition; 17-18
standard deviation,
  statistical variable,
    obtaining, with SV’std; 14-4
Standard ML,
  See Also CPN ML language;
    CPN ML,
      extensions to; 30-2
      restrictions and modifications; 30-3
Start ML (Aux menu),
  See Also CPN ML language;
    reference description; 23-15
Start Step (Sim menu),
  reference description; 22-9
starting,
  See Also entering; quitting; stopping;
    Design/CPN; 1-3
    simulation step; 22-9
states,
  CP net,
    initializing with Initial State command (Sim
      menu); 6-18
  current,
    term definition; 2-11
  execution,
    loading, with Load State (File menu); 5-16
    saving, with Save State (File menu); 5-15
  initial,
    concurrent execution; 8-4
    term definition; 2-11
  saved,
    entering the simulator with; 6-12
    starting execution with; 5-16
    term definition; 5-15
  system,
    generating an initial, with Initial State command
      (Sim menu); 22-12
    term definition and characteristics; 2-11
    time in relation to; 12-2
    transitions as representation of; 8-3
static scoping,
  CPN ML feature; 30-2
statistical variables,
  (chapter); 14-1
  accessing; 14-3
  charts and,
    using (chapter); 16-1
    clearing; 14-5
    creating; 14-2
    initializing; 14-2
      in Resource Use model; 16-5
    methodology for use; 14-1
    structure; 14-2
    updating,
      in Resource Use model; 16-6
    updating; 14-3
statistics,
  Resource Use model; 16-5
status bar,
  characteristics; 1-4
status bar information,
  error reporting from Syntax Check command (CPN
    menu); 21-27
steps,
  line chart updating period; 21-16
  number,
    accessing with step function; 39-4
    recording information about,
      specification with General Simulation Options
        (Set menu); 6-10
**Index**

**steps (cont’d),**
  reporting information about,
  with the Simulation Code Options command (Set menu); 24-26
  simulation,
  starting; 22-9
  step function,
  reference description; 41-5
  syntax and characteristics; 39-4
  term definition; 8-12

**Stop (Sim menu),**
  reference description; 22-11

**stop criteria,**
  simulation,
  specifying conditions for, with General Simulation Options (Set menu); 6-9
  Stop ML (Aux menu),
  See Also CPN ML language;
  reference description; 23-15

**stopping,**
  simulation,
  specifying criteria for, with the Simulation Code Options command (Set menu); 24-25
  with Stop command (Sim menu); 22-11
  with stop_simulation function; 41-6

**stop_simulation function,**
  reference description; 41-6

**strings,**
  See Also colorsets;
  colorsets,
    ordering of; 32-28
    syntax and characteristics; 36-3
    term definition; 2-4
    testing for membership in; 32-26
  comparison operators; 32-8
  control character insertion; 32-8
  escape sequences; 32-8
  expression operators; 36-3
  functions,
    standard ML, list of supported; 41-11
    length; 32-8
    operations; 32-8
    representing colorset value as,
      with mkst_col’ operation; 32-8
    representing colorset value as; 32-19
    representing multiset value as; 32-8
    selecting text to a specified,
      with Select to (Text menu); 28-5
    value identifiers,
      declaring; 33-2

**structure,**
  statistical variables; 14-2

**style sheet,**
  creating; 24-10

**submodel,**
  term definition; 9-3, 11-1

**subnet,**
  term definition; 9-3, 11-2

**subpages,**
  creating; 11-5
  with Move to Subpage command (CPN menu); 21-18
  deleting; 11-23
  references to; 11-24
  designating net components to move to; 11-6
  improving the appearance; 11-11
  moving detail to,
    with Move to Subpage command (CPN menu); 21-17
  navigating,
    from to the superpage; 11-5
    to from substitution transition; 17-3
    replacing substitution transition with,
      using the Replace by Subpage command (CPN menu); 21-19
    ResmodSubtrans model; 11-3
    term definition; 11-1
    using more than one; 11-17

**subroutine,**
  subpages compared to; 11-21

**subsets,**
  See Also colorsets;
  colorsets,
    ordering of; 32-28
    syntax and characteristics; 32-25
    term definition; 2-4
    testing for membership in; 32-26
    comparison operators; 32-8
    control character insertion; 32-8
    escape sequences; 32-8
    expression operators; 36-3
    functions,
      standard ML, list of supported; 41-11
      length; 32-8
      operations; 32-8
      representing colorset value as,
        with mkst_col’ operation; 32-8
      representing colorset value as; 32-19
      representing multiset value as; 32-8
      selecting text to a specified,
        with Select to (Text menu); 28-5
      value identifiers,
        declaring; 33-2
substitution (cont’d),
  transitions (cont’d),
    creating, when moving detail to a subpage; 21-18
    effect of Child Object (Makeup menu) on; 25-10
    effect of duplication on; 25-6
    effect of moving nodes between pages on; 25-7
    naming; 11-8
    navigating to a subpage from; 17-3
    replacing with subpage; 21-19
    reversing the creation of; 11-22
    specifying the location of; 11-6
    substitution transition creation mode, term
definition; 11-6
term definition; 9-3, 11-1, 21-18
Substitution Transition (CPN menu),
  reference description; 21-19
subtracting,
  functions,
    with subtraction operator (-); 41-7
    multisets; 2-8, 37-4
    subtraction operator reference description; 41-2
    places from fusion sets,
      with Fusion Place command (CPN menu); 21-22
subtraction operator (-),
  function subtraction; 41-7
  reference description; 32-6
  subtracting multisets; 37-4
  reference description; 41-2
sum,
  statistical variable,
    obtaining, with SV’sum; 14-5
sum of the squares,
  statistical variable,
    obtaining, with SV’ss; 14-5
sum of the squares of deviation,
  statistical variable,
    obtaining, with SV’ssd; 14-5
summaries,
  reference,
    (chapter); 17-1
supernodes,
  changing mode attributes for; 24-13
superpage,
  improving the appearance; 11-9
  navigating,
    to from a port place; 17-3
    to from the subpage; 11-5
    ResmodSubtrans model; 11-3
term definition; 11-1
SV’avg function,
  reference and use; 14-3
SV’count function,
  reference and use; 14-3
SV’first function,
  reference and use; 14-4
SV’init function,
  reference and use; 14-5
SV’maximum function,
  reference and use; 14-4
SV’minimum function,
  reference and use; 14-4
SV’ss function,
  reference and use; 14-5
SV’ssd function,
  reference and use; 14-5
SV’std function,
  reference and use; 14-4
SV’sum function,
  reference and use; 14-5
SV’value function,
  reference and use; 14-4
SV’vari function,
  reference and use; 14-5
switching,
  among page instances,
    with Select Instance command (Sim menu); 22-12
  reference description; 32-6
    simulation code options that affect the speed of;
      24-21
syntax,
  check,
    compulsory restrictions, list and characteristics;
      17-22
    performing; 6-1
    compulsory restrictions,
      list; 17-22
    descriptions,
      format; 30-4
    errors,
      deciphering ambiguous messages; 7-5
      handling (chapter); 7-1
      locating; 7-2
      missing colorset; 7-2
      optional, specifying which to be reported; 24-18
      undeclared CPN variables; 7-4
      guards; 5-8
Syntax Check (CPN menu),
  performing a syntax check with; 6-2
  reference description; 21-26
  specifying which errors reported,
    with the Syntax Options command (Set menu);
      24-18
Syntax Options (CPN menu),
  selecting optional syntax restrictions with; 6-1
Index

Syntax Options (Set menu),
   place name validation criteria; 40-2
   reference description; 24-18

System,
   connectors,
      characteristics; 17-10
   defaults,
      attributes, term definition; 4-2
      changing; 17-19
      changing graphic attributes; 24-3
      changing shape attributes; 24-5
      changing text attributes; 24-2
      copying; 17-19
   page attributes, changing; 24-12
   setting diagram defaults with; 24-34
   term definition and characteristics; 4-2, 17-18
   using; 17-19

nodes,
   characteristics; 17-10

objects,
   characteristics; 17-7
   characteristics and types; 17-10
   term definition; 17-6
   regions,
      characteristics; 17-10
   state,
      generating an initial; 22-12

Text,
   adding to,
      a rectangle; 3-9
      a rectangle, while creating it; 3-9
      adjusting a graphic object to fit,
      with Fit to Text command (Makeup menu); 25-5
      attributes,
         changing for selected objects; 24-2
         changing system and/or diagram defaults; 24-2
      brackets used by Load Text and Select to Brackets commands,
         specifying, with Text Options command (Set menu); 24-17
      character counts used by Load Text and Select to Brackets commands,
         specifying, with Text Options command (Set menu); 24-17
      color,
         changing; 24-5
      CPN regions,
         specifying options for merging; 24-17
      editing; 3-13
      effect of,
         Copy command on; 20-4
         Cut command on; 20-3
         Paste command on; 20-6
      entering; 3-13
      into a global declaration node; 4-13
      finding,
         with Find (Text menu); 28-3
      impact of CPN Region command on; 21-7
      labels,
         creating, modifying, and moving; 23-10
      mode,
         characteristics; 3-3
      creating objects from; 3-18

terminating (cont’d),
   nodes declaration mode; 21-8
   place creation mode; 21-2

termination,
   simulation,
      specifying conditions for, with General Simulation Options (Set menu); 6-9

terminology,
   reference description; 1-1

Testing,
   ML Evaluate command (Aux menu),
      use for testing new and changed code; 23-15
   optional syntax errors,
      specifying which to be reported, with the Syntax Options command (Set menu); 24-18

text,
   tags,
      CPN regions, specifying options for merging; 24-17
   temporary,
      impact of CPN Region command on; 21-7
   templates,
      creating; 24-10
   temporary,
      declaration nodes,
         creating with Declaration Node command (CPN menu); 21-7
      term definition and characteristics; 17-6
   terminating,
      arc creation mode; 21-5
      CPN region creation mode; 21-7

Tab,
   inserting in strings; 32-8

Tags,
   page,
      deletion requirements; 20-6
      substitution,
         characteristics; 17-10
   tan operation (tangent),
      reference description; 32-6
   tangent operation (tan),
      reference description; 32-6
   templates,
      creating; 24-10

Temporary,
   declaration nodes,
      creating with Declaration Node command (CPN menu); 21-7
   term definition and characteristics; 17-6

Tab,
   inserting in strings; 32-8

Tags,
   page,
      deletion requirements; 20-6
      substitution,
         characteristics; 17-10
   tan operation (tangent),
      reference description; 32-6
   tangent operation (tan),
      reference description; 32-6
   templates,
      creating; 24-10

Temporary,
   declaration nodes,
      creating with Declaration Node command (CPN menu); 21-7
   term definition and characteristics; 17-6

Terminating,
   arc creation mode; 21-5
   CPN region creation mode; 21-7

Design/CPN Reference Manual for the Macintosh   IDX-59
text (cont’d),
mode (cont’d),
detecting when system is in both group mode and;
28-2
entering; 28-2
impact on duplication; 25-6
leaving; 28-2
navigating in; 17-3
term definition; 3-2
moving,
to beginning of current text object; 28-4
with Drag command (Makeup menu); 25-2
nodes,
specifying options for merging; 24-17
place use of; 21-2
pointers,
following to find the error location; 21-26
locating an error with; 7-3
moving to the node pointed to, with Child Object
(Makeup menu); 25-11
moving to the node pointed to, with Parent Object
(Makeup menu); 25-10
term definition; 7-3
using as hypertext; 28-4
replacing,
with Find (Text menu); 28-3
searching for,
with Find (Text menu); 28-3
selecting,
with Select All Text (Text menu); 28-5
with Select to (Text menu); 28-5
with Select to Bracket (Text menu); 28-5
tool,
term definition and illustration; 3-3
transition use of; 21-3
text attributes,
components; 17-15
Text Attributes (Set menu),
reference description; 24-2
Text menu,
See Also menus;
commands reference (chapter); 28-1
Enter Text Mode command; 28-2
adding text to rectangles with; 3-9
Find Beginning command; 28-4
Find command; 28-3
Find Next command; 28-4
Leave Text Mode command; 28-2
Select All Text command; 28-5
Select to Bracket command; 28-5
Select to command; 28-5
Text Options (Set menu),
reference description; 24-17
time,
See Also concurrency;
(chapter); 39-1
appending,
time lists to multisets; 39-4
time lists to multisets, with time append operator
(“@”); 41-5
delay,
transition time region, reference description;
40-15
function; 41-5
output arc inscription use of; 39-2
syntax and characteristics; 39-4
time region use; 39-3
time region use; 40-15
increasing the realism of simulation with; 12-15
initial marking region (place),
time delay syntax and characteristics; 40-3
input arc inscriptions,
overriding time stamps with “@ignore”; 40-5
line chart,
updating period; 21-16
multisets; 37-10
reading, with input_tms function; 41-8
writing, with output_tms function; 41-8
output arc inscriptions,
apponding time delays to; 40-6
output arc inscriptions; 12-8
real,
term definition; 12-2
regions,
assigning time stamps with CPN Region (CPN
menu); 12-10
creating; 21-6
creating from auxiliary regions; 23-13
term definition; 12-7
removing from a colorset; 39-1
representation methods in CP nets; 12-2
simulated,
(chapter); 12-1
characteristics; 12-2
impact on enablement; 12-3
term definition; 12-2
uses for; 12-3
simulation with,
and without; 12-14
disabling, with the Simulation Code Options
command (Set menu); 24-22
generating code for, with the Simulation Code
Options command (Set menu); 24-22
Index

**time (cont’d),**

- simulation with (cont’d),
  - specifying; 12-4
- specifying, with General Simulation Options command (Set menu); 24-24
- specifying, with the with_time function; 41-6

**stamps,**

- @ operator use for appending; 30-4
- assigning, example; 12-10
- colorset defaults; 39-1
- giving to a token; 12-7
- initial markings and; 12-9
- multisets and; 12-10
- omitting; 12-8

- state in relation to; 12-2
- testing for the with time simulation option; 39-4
- time append operator (@); 41-5

**time region,**

- characteristics and use; 39-3
- timed colorsets,
  - See Also colorsets;
  - declaration; 39-1
  - declaring; 12-6
  - defaults; 39-1
  - term definition; 12-2

- timed token,
  - term definition; 12-2
- transition,
  - region reference description; 40-15

**title,**

- bar charts,
  - specifying; 21-11
- history charts,
  - specifying; 21-11
- line charts,
  - specifying; 21-15

**tokens,**

- See Also multisets;
- constraining,
  - multiple; 5-11
  - with more complex guards; 5-10
  - with simple guards; 5-9
- giving a time stamp to; 12-7
- specifying,
  - exact values with constants; 5-4
  - multiple tokens with the different values; 5-6
  - multiple tokens with the same value; 5-5
  - with CPN variables; 5-7
- term definition and characteristics; 2-3, 2-7, 37-1
- timed,
  - delay expression syntax; 12-7
- values,
  - constraining; 5-8
  - constraining with the use of guards; 5-8

**Top to Bottom (Align menu),**

- reference description; 29-7

**Top to Top (Align menu),**

- reference description; 29-7

**top-down development,**

- hierarchical CP nets; 11-14

**Transition (CPN menu),**

- reference description; 21-3

**transition creation mode,**

- term definition; 4-4

**Transition Feedback Options (Set menu),**

- reference description; 24-31

**transition names,**

- changing; 17-21
- entering; 17-21
- term definition; 17-20

**transition tools,**

- term definition and illustration; 4-4

**transitions,**

- See Also CPN objects, classes of; rectangles;
  - as CP net component; 2-1
  - as state representation; 8-3
- code segments,
  - examples; 40-19
  - reference description; 40-16
  - updating bar charts from; 15-10
  - updating line charts from; 15-27
- concurrent,
  - firing; 8-3
  - creating,
    - multiple; 21-3
    - regions of; 21-6
  - with Transition (CPN menu); 4-4
- enablement,
  - reference variables restricted from effects on; 35-1
  - explanation of the setting in the Occurrence Set Options dialog; 8-21
- factors controlling,
  - enablement; 5-2
  - occurrence; 5-2
- graphical appearance when enabled,
  - specifying with Transition Feedback Options command (Set menu); 24-31
- guards,
  - syntax, use, and restrictions; 40-15
- names,
  - duplicate, reporting with the Syntax Options command (Set menu); 24-20
troubleshooting (cont’d),
  printer not specified,
  problem symptoms and solutions; B-2
  settings file missing or obsolete,
  problem symptoms and solutions; B-1

tuples,
  See Also colorsets;
  colorsets,
  constructing multiset for; 32-25
  ordering of; 32-28
  syntax and characteristics; 32-10
  term definition; 2-5
  constructors,
  characteristics and use; 36-8
  term definition; 2-6
  expression constructors; 36-3
  formats in syntax description; 30-5
  multiplying multisets of; 37-5, 41-2
  patterns; 36-7
  input arc inscription example; 40-10
  term definition and characteristics; 2-6
  specifying in expressions; 36-2
  term definition; 2-5
  value,
  declaring; 33-2
  term definition; 2-5
  with CPN variables,
  input arc inscription example; 40-10

type variables,
  term definition; 30-4

typing,
  polymorphic,
  CPN ML feature; 30-1
  strong,
  CPN ML feature; 30-1

unbound,
  term definition; 2-9
  term definition; 5-7

unbound variables,
  expression,
  output arc inscription example; 40-14

Undo (Edit menu),
  reference description; 20-2

union colorsets,
  See Also colorsets;
  input arc inscription example; 40-12
  selectors,
  specifying; 32-16
union colorsets (cont’d),
  selectors; 32-19
  syntax and characteristics; 32-16
  testing for membership in; 32-27
unit colorsets,
  See Also colorsets;
  ordering of; 32-28
  syntax and characteristics; 32-2
unlocking,
  objects; 24-4
  regions relative to the parent,
    with Size component (Region Attributes
    command-Set menu); 24-9
untimed reserved word,
  making a colorset with; 39-1
Update Chart (Sim menu),
  reference description; 22-13
  updating,
    bar charts with; 15-10
    line charts with; 15-27
updating,
  bar charts,
    from transition code segments; 15-10
    specifying values for; 15-9
    update period specification; 21-12
    using SC_upd_chart function in a transition code
    segment; 15-10
    with chart code segment; 15-8
  charts; 15-1
    with Update Chart command (Sim menu); 22-13
  history charts; 15-16
    update period specification; 21-12
  line charts; 15-24
    from transition code segments; 15-27
    specifying values for; 15-25
    update period specification; 21-16
    using LC_upd_chart function in a transition code
    segment; 15-27
    with chart code segment; 15-24
  statistical variables; 14-3
use command,
  arc inscriptions not permitted to use; 40-5
user interface,
  code segments used for; 40-17
  design,
    See appearance;
    Design/CPN components; 1-4

V

val reserved word,
  reference variables defined with; 35-1
  syntax and characteristics; 33-1
val-defined identifiers,
  expression use; 36-2
validating,
  place names; 40-2
value (clr’) function,
  syntax and characteristics; 32-23
value (col’) function,
  syntax and characteristics; 32-22
values,
  (chapter); 33-1
  bar charts,
    specifying the type and range; 21-13
    binding to variables,
      with Bind command (Sim menu); 22-3
    declaring; 33-1
    expression use; 36-2
  history charts,
    specifying the type and range; 21-13
  line charts,
    specifying the type and range; 21-16
    representation; 33-1
  statistical variables,
    average; 14-3
    count; 14-3
    current value; 14-4
    first value; 14-4
    maximum; 14-4
    minimum; 14-4
    standard deviation; 14-4
    sum; 14-5
    sum of the squares; 14-5
    sum of the squares of deviation; 14-5
    variance; 14-5
  tokens,
    constraining; 5-8
    constraining with the use of guards; 5-8
    specifying multiple tokens with the different
    values; 5-6
    specifying multiple tokens with the same value;
    5-5
    specifying with constants; 5-4
    specifying with CPN variables; 5-7
  tuple,
    term definition; 2-5
variables,

CPN,

See Also CPN variables; (chapter); 34-1
as CPN ML extension; 30-2
binding values to with Bind command (Sim menu); 22-3
calculated, identification of in included bindings list box; 22-4
calculated, identification of in potential bindings list box; 22-5
code segment restrictions; 40-17
code segment use of; 13-1
declaration syntax; 34-2
expression use; 36-2
global reference, syntax and characteristics; 35-3
input arc inscription example; 40-9
output arcs, binding of; 13-1
records with, input arc inscription example; 40-11
specifying token values with; 5-7
term definition and characteristics; 2-9, 34-1
tuples with, input arc inscription example; 40-10
free,
term definition; 40-5
instance reference,
syntax and characteristics; 35-3
local,
declaring, with let construct; 38-1
multisets,
term definition, syntax, and use; 37-1
page reference,
syntax and characteristics; 35-3
reference,
See Also reference variables;
(chapter); 35-1
arc inscriptions not permitted to use; 40-5
as CPN ML extension; 30-3
expression use and restrictions; 36-2
restrictions on use; 35-1
val-defined; 35-1
val-defined, syntax and characteristics; 35-2
statistical,
(chapter); 14-1
accessing; 14-3
charts and, using (chapter); 16-1
clearing; 14-5
creating; 14-2
initializing; 14-2
initializing, in Resource Use model; 16-5
methodology for use; 14-1
structure; 14-2
updating; 14-3

variables (cont’d),
statistical (cont’d),
updating, in Resource Use model; 16-6
term definition; 34-1
type,
term definition; 30-4
unbound,
output arc inscription example; 40-14

variance,
statistical variable,
obtaining, with SV’vari; 14-5

variant record,
See union colorset;

vertexes,
term definition; 3-14
Vertical (Align menu),
reference description; 29-2
Vertical Spread (Align menu),
reference description; 29-5

visibility,
editor regions,
changing; 17-3
simulator regions,
changing; 17-3
visibility (graphical attribute),
changing; 17-16
characteristics; 17-16

visibility of page border (page attribute),
characteristics; 17-15

visible,
page borders,
rendering for display or printing; 24-11

W, X, Y

Wedge (Aux menu),
reference description; 23-8

wedged state,
See Also troubleshooting;
getting out of; 3-5

wedges,
creating, modifying, and moving; 23-8
shape attributes,
changing; 24-7

wildcards,
not permitted in CPN ML; 30-4

with_code function,
reference description; 41-6

with_time function,
reference description; 41-6
syntax and characteristics; 39-4
write_report function,
  reference description; 41-6
writing,
  colorsets,
    with output_col function; 41-8
  multisets,
    timed, with output_tms function; 41-8
    with output_ms function; 41-5, 41-8
  reports,
    with write_report function; 41-6

Z

zero function,
  reference description; 41-7
zeroing,
  with zero function; 41-7