

INDEX

A

$a \sqcap C$, 41, 124
 $a \sqcap \square$, 112
 action, 175
 private, 175
 shared, 175
 adjoint
 functor, 150
 adjunction, 149
 (co)unit, 150
 dual of, 150
 right/left adjoint, 150
 amalgamated sum. *See* pushout
 amnesic concrete category, 98, 101
ANCESTOR, 31
 architectural connector
 ASYNC, 193, 195
 complete, 211
 EXTENSION CHORD, 202
 generalised, 210
 heterogeneous, 213
 in CommUnity, 193
 INHIBIT, 204
 instantiation, 194
 monitors, 199
 SUBSUME, 201
 SYNC, 198
 architectural school, 208
 ASYNC, 195
 autom, 32
 automata
 category of, autom, 32
 reachable, 44

C

cable, 178, 182
 cartesian morphism, 101
 cat, 87
category
 ANCESTOR, 31
 autom, 32
 c-DSGN, 181
 CLASS_SPEC, 50, 86, 139
 CLOS, 57
 co-complete, 79

comma-category $a \sqcap C$, 124
 comma-category $a \sqcap C$, 41
 comma-category $a \sqcap \square$, 112
 concrete, 97
 coordinated, 168
c-SIGN, 180
 definition, 29
 discrete, 38, 43
 dual, 37
 equivalent, 142
 finitely co-complete, 79
 functor structured, 117
 generated from a graph, 32
GRAPH, 30
 indexed, 124
 isomorphic, 88
 monoids as categories, 38
 of categories, cat, 87
 of partial functions, 43
 of power sets and inverse functions, 43
 of processes, 118
 opposite, 37
PAR, 43
POWER, 43
 pre-order as a, 31
PRES, 58
PRES_{LTL}, 54
 product of, 38
REACH, 44
SET, 30
 sets as categories, 38
SET_l, 39
spa, 117
SPRES, 58
 subcategory, 42
THEO, 58
THEO_{LTL}, 54
c-DSGN, 181
 channel, 174
 input, 174
 local, 174
 output, 174
 private, 174
 class inheritance hierarchies
 as graphs, 26
CLASS_SPEC, 50, 86, 139
 cleavage, 103
CLOS, 57
 closure system, 57
 cocartesian morphism, 102
 co-completeness, 79
 co-cone

- base of, 78
- category of, 79
- colimit, 78
- commutative, 78
- definition of, 78
- edge of, 78
- vertex of, 78
- co-equaliser, 74
 - quotients in **SET**, 74
- cofibration, 102
- colimit
 - concrete, 100
 - definition of, 78
- comma-category, 41, 112, 124
- Community
 - cable, 182
 - compositionality, 188
 - configuration (well formed), 183
 - design, 177
 - design morphism, 180
 - program, 175
 - refinement morphism, 184
 - signature, 177
 - signature morphism, 179
- commutative (diagram), 33
- compositionality
 - design formalisms, 207
 - in CommUnity, 188
 - of programs relative to specifications, 112
- concrete
 - (co)limits, 100
 - (co)reflective subcategories, 100
 - amnesic category, 98, 101
 - category, 97
 - fibre-complete category, 98, 106
 - fibre-discrete category, 98
 - functor, 99
 - subcategories, 99
- concrete category
 - has discrete structures, 166
- cone, 81
- configuration
 - refinement, 188
 - well-formed), 183
- configuration), 183
- connector. *See* architectural connector
- higher-order, 226
- construct, 97. *See also* concrete category
- contravariant
 - graph homomorphism, 29
- contravariant functor, 86
- coordinated concrete category/faithful functor, 168
- coproduct, 66
- co-reflection
 - arrow, 45
 - co-reflective subcategory, 45
 - REACH** as a co-reflective subcategory of **AUTOM**, 44
- creates
 - colimits, 93
- c-SIGN**, 180

D

- $D(g)$, 175
- $D(v)$, 175
- design, 177
 - action, 198
 - buffer, 176
 - cart, 197
 - check-in, 198
 - counter, 199
 - extension cord, 203
 - gate, 198
 - inhibit, 204
 - monitored_cart, 199
 - morphism, 180
 - pipe, 212
 - printer, 184
 - receiver, 193
 - refinement morphism, 184
 - sender, 176
 - subsume, 201
 - user, 183
- design formalism, 205
 - compositionality, 207
- diagram, 33
 - commutative, 33
 - shape, 33
- discrete
 - category, 38
 - lift, 166
 - structures (functor has), 166
 - structures (functor/concrete category has), 166
- dual
 - of a category, 37
 - of a functor, 85
 - of a natural transformation, 141
 - of an adjunction, 150

E

- Eiffel class specification, 48
- embedding, 88
- epi (also epic and epimorphism), 36
- equaliser, 75
- equivalence
 - of categories, 142
- EXTENSION CHORD**, 202

F

- faithful, 88
- fibration, 102
 - cloven, 103
 - split, 105
- fibre
 - general definition, 100
 - of a concrete category, 98
- fibre-complete concrete category, 98, 106

fibred product. *See* pullback
 fibre-discrete concrete category, 98
 fitting, 228
 full, 88
 full subcategory, 43
 functor, 85
 (co)reflective, 144
 (co)reflector, 145
 composition law, 87
 contravariant, 86
 coordinated, 168
 creates colimits, 93
 dual of, 85
 embedding, 88
 faithful, 88
 full, 88
 has discrete structures, 166
 identity, 85
 isomorphism, 88
 lifts colimits, 93
 nodes, 85
 preserves colimits, 93
 preserves isomorphisms, 89
 reflects colimits, 93
 reflects isomorphisms, 89
 right/left adjoint, 150
 functor structured category, 117

G

Gamma
 morphisms, 169
 programs, 169
graph, 30
 category of, 30
 definition, 25
 dual, 29
 homomorphism, 28
 path, 29

H

higher-order connector, 226
 fitting morphism, 228
 instantiation, 229
 parameterised instantiation, 230

I

in(v), 174
 indexed category, 124
 flattening of, 124
 indiscrete. *See* discrete (dual)
INHIBIT, 204
 initial object, 62
 in **ANCESTOR**, 64
 in **LOGI**, 62
 in **PAR**, 62
 in **SET**, 62

 in **SET**_{*p*}, 62
 institution, 129
 CTL, 158
 defined via a split (co)fibration, 130
 generalised models, 132
 initial/terminal semantics, 136
 map, 162
 modal logics, 132
 morphism, 162
 the p-property, 136
 interpretation between temporal theories.
 See temporal theory: morphism of
 isomorphism, 34
 functor, 88
 inverse, 34
 isomorphism-closed full subcategory, 44

L

L(g), 175
 lifts
 colimits, 93
 limit, 81
 concrete, 100
loc(v), 174

M

monitor, 199
 mono (also monic and monomorphism), 36
 monoid, 38
 morphism
 epi (or epic), 36
 inverse, 34
 isomorphism, 34
 mono (or monic), 36
 of graphs, 28
 split (mono, epi), 36

N

natural transformation, 140
 (co)unit of an adjunction, 150
 composition law, 141
 co-unit of a reflection, 146
 dual of, 141
 identity, 140
 natural isomorphism, 142
 unit of a reflection, 145
 null object, 64

O

object
 initial, 62
 null, 64
 terminal, 63

zero, 64
 $out(v)$, 174

P

PAR, 43
path in a graph, 29
pointed sets. *See* **SET_D**
POWER, 43
p-property, 136
PRES, 58, 133
preserves
 colimits, 93
 isomorphisms, 89
PRES_{LTL}, 54
PROC, 118
process, 118
product, 68
 in **LOGI**, 69
 in **SET**, 68
 in **SET_D**, 69
 of categories, 38
proof systems
 as graphs, 28
 $prv(v)$, 174
pullback, 75
 in **SET_D**, 76
pushout, 71
 in **CLASS_SPEC**, 80
 in **SET**, 71
 vs. the ‘Join Semantics rule’, 81
pushouts
 vs. multiple inheritance, 72

R

$R(g)$, 175
REACH, 44
realisation
 of configurations (diagrams), 113
 of specifications by programs, 111
reduct
 for temporal logic, 55
refinement
 of configurations, 188
 of designs (morphism), 184
reflection
 (co)reflective functor, 144
 arrow, 47
 for a functor, 144
 reflective subcategory, 48
 THEO as a reflective subcategory of
 PRES and **SPRES**, 58
 THEO as a reflective subcategory of
 PRES and **SPRES**, 58
reflector
 for a functor, 145
reflects

colimits, 93
isomorphisms, 89

S

SET, 30
SET_D, 39
shape (of a diagram), 33
skip, 175
slice-category. *See* comma-category. *See* comma-category
spa, 117
split (mono, epi), 36
split fibration, 105
SPRES, 58, 134
strict theory presentation
 in a (π)-institution, 134
 in a closure system, 58
subcategory, 42
 co-reflective, 45
 full, 43
 isomorphism-closed full, 44
 reflective, 48
SUBSUME, 201
sum, 66
 in **LOGI**, 67
 in **PROOF**, 67
 in **SET**, 67
superposition (or superimposition), 181
SYNC, 198

T

temporal logic
 presentations, 52
 propositions, 51
 reducts, 55
 semantics, 52
 signatures, 51
 theories, 52
temporal theory
 as a concrete category, 98
 category of, 54
 morphism of, 53
 presentation of, 54
terminal object, 63
 in **ANCESTOR**, 64
 in **LOGI**, 63
 in **PAR**, 63
 in **SET**, 63
 in **SET_D**, 64
THEO, 58, 133
THEO_{LTL}, 54
theory
 as a split (co)fibration, 134
 in a (π)-institution, 133
 in a closure system, 58
 in temporal logic, 54
theory presentation

- as a split (co)fibration, 134
- in a (π) -institution, 133
- in a closure system, 58
- in temporal logic, 54

transition systems

- as graphs, 27

U

$U(g)$, 175

unit

- of an adjunction, 150

Z

zero object, 64

—

π -institution, 128

- presented by an institution, 130, 134

