

---

# INDEX

---

- Abbreviations, 244
- abort, 65
- Access to nodes
  - and links, 39
  - in the united world, 43
- Actions in nodes, 49
- Act(s), 60, 73
  - flow, 74
  - fusion, 81
- Addition, 82
- ADDRESS, 68, 71
- Address(es), 63
  - absolute, 47
  - mapping, 47
- Advance, 60
- Aerial object, 202
- Agents
  - intelligent, 28
  - mobile, 28
- Aggregation, 84
- Air
  - defense, programming
    - example, 229
  - traffic management, 201, 237
- Alien networks, 41
- all, 65
- and, 87
- andparallel, 88
- any, 65
- Append, 83
- Application
  - areas, main, 235–238
  - scenario, 26
- Arithmetic, 81
  - acts, 82
    - examples, 82
- Artificial life, distributed, 5
- Assignment(s), 74, 80
  - examples of, 80
- Autonomy, 86
- BACK, 68, 72
- back, 65
- Belongs, 78
- Book
  - organization, 30
  - previous, 26
- Branches, splitting into, 86
- Branching, 86
  - rules
    - examples, 88
    - semantics, 87
- Broadcasting
  - to all nodes, 135
  - tunnel and surface, 40
- Central unit, finding, 192
- Centralized, 188
- Chain, 188
- Cognitive system(s)
  - distributed, 214
    - autonomous, 237
    - dynamic, 213
- Code injection, 74, 81
  - examples of, 81
- Column movement, 169
- Command and control (CC)
  - basic scenario, 195
  - components, intelligent, 3
  - implementation, adding payload to, 197
  - implementing in WAVE-WP, 196
  - recursive hierarchical, 195
- Composition, 81
  - decomposition, 83
    - examples, 84
  - independent or parallel, 61
  - parallel-sequential, 61
  - sequential, 61
- Computation, shifting from, 1
- Computer networking, 28
- Concatenation, 84

- Conclusions, 56, 97, 121, 156, 182, 206, 231
- Congested links and nodes, finding, 226
- Constant(s), 60
  - aggregate, 63
  - auxiliary, 65
  - examples of, 65
  - general on, 62
  - special, 62
- CONTENT, 68
- Contenting, 83
- Control
  - centralized, using of, 146
  - global, setting up, 204
  - migrating, 127
- Cooperation, between robots, 210
- Cooperative robotics, 29
  - massive, 236
- Coordination of large systems, 1
- count, 94
- Coverage with rules, 50
- create, 91
- Crisis (crises)
  - management
    - in open networks, 223
    - more scenarios and systems, 207
  - reaction forces, advanced, 236
- Data
  - definitions, 62
  - remote, 53
- Defense, global, 238
- Degree, 82
- Destination regions, 36
- direct, 65
- Distributed
  - algorithms, 6
  - artificial life, 5
  - cognition, 213
  - cognitive systems, 213
  - computing, 27
  - implementation, 15
  - inference, 137
  - interpretation issues, 118
  - knowledge
    - processing, 235
    - representation and, 21
  - management
    - network creation, template-based, 130
    - of road and air traffic, 237
    - solving problems of, 198
    - using dynamic infrastructures, 185
  - processing, 21
  - summation
    - cyclic solution, 127
    - using migrating control, 127
  - systems, 27
  - virtual world, creating, 172
  - WAVE-WP system,
    - embedding, 223
- Distribution
  - between particular doers, 131
  - of information between doers, 126
  - of physical-virtual world, 46
  - problems and details, 6
- Division, 82
- Dynamic patrol, 211
- DOER, 68, 71
- Doer(s), 45, 64
  - and their connections, 45
  - and their networks, 99
  - bound, 68
  - distribution between, 46
  - local operation in, 109
  - multiple, 109
  - requesting, 114
- Does not belong, 78
- done, 65
- Dynamic
  - environments, 99, 201
  - hierarchy, 192
  - infrastructures, 185
  - patrol, 211
- Entities
  - communicating and impacting, 133
  - live, 132
  - mobile, 132
  - seeing other, 132
- Equal, 78
- Execution world, 44
- Expressions, 95
  - examples of, 95
- fail, 65
- Filter(s), 74, 78
  - examples of, 79
- Flow-act, 74
- free, 92
- fringe, 65
- Fusion-act, 74
- Future combat systems, 220
- grasp, 90
- Greater, 78
- Greater-or-equal, 78

- Grid computing, 29
- Group movement, modifications, 163
- GROUND, 68, 73
- Hierarchy, dynamic, 192
- Hop(s), 74
  - examples of, 77
  - simultaneous, 77
  - splitting, 77
- Hospital
  - multirobot service, 216
  - robotized, 215
  - world representation, 216
- Indexing, 83
- Information, 62
- INFRA, 68, 72
- Infrastructure(s)
  - creating, from the center, 193
  - distributed creation and reconfiguration, 186
  - dynamic, 185
  - global, using in
    - WAVE-WP, 229
  - hierarchical, 186
  - link, 65
    - using, 76
  - modification, 190
  - persistent, creation of and moving with, 159
  - sketch, 229
- Integration
  - details, 42
  - with frontal variables, 108
  - with other systems, 105
- Intelligent
  - agents, 28
  - components, 3
  - network management, 236
  - solutions, 228
  - systems, 3
- Interoperability, 2
- Interpretation
  - distributed, issues, 118
  - of expressions, 104
  - patterns, 104
- Interpreter
  - integration with other systems, 105
  - main components, 101
- Implementation basics, 9
- infinite, 65
- JOINT, 68, 71
- Knowledge
  - network(s), 21, 38, 103
    - migration between doers, 117
    - representation and processing, 21
- KIND, 68
- Language
  - syntax, extended, 241
  - top organization, 60
- Layer(s), 160
  - extending to any number of, 160
- Less, 78
- Less-or-equal, 78
- LINK, 68, 70
- Links
  - bypass and horizontal, 109
  - congested, finding of, 226
- Management
  - of large systems, 1
  - layer, higher, establishing, 224
  - scenarios, complex, more, 199
- max, 94
- Mapping strategies, 118
- Merging, 84
- min, 94
- Mission scenarios, 157
  - exemplary, 157
- Mobile
  - agents, 28
  - doers, adding payload, 143
  - entities, 132
  - robotics, 29
  - tracking, 202
- Mobility
  - in execution world, 139
  - in physical world, 140
- Move, 60
- Movement (moving)
  - combined, sequential-parallel, 147
  - data through tracks, 116
  - in a column, 164, 169
  - in EW, 75
  - in physical world (PW), 74
    - direct, 144
    - parallel, 147
    - sequential, 145
  - into new physical location, 113
  - in VW, 75
  - of group, 158, 163
  - of multiple doers
    - by turns, 142
    - synchronized, 141

- Movement (moving) (*Continued*)
  - of single doer, 140
  - reverse, or heads-first, 163
  - simultaneous, of all nodes, 161
  - solutions, different,
    - integrating, 166
  - stepwise, 158
  - to averaged positions, 162
  - variants of, 115
- Multiplication, 82
- Multiple doers, 109
  - elementary operations
    - involving of, 109
- Multirobot
  - hospital scenarios, 215
  - patrol, as a cognitive system, 214
  - service snapshot, 219
- Navigation in space, 49
- Network(s)
  - alien, linking with, 41
  - creation, 86, 91
  - examples, 92
  - management, intelligent, 236
  - partitioning, 18
- nil, 65
- noback, 65
- Node(s)
  - actions in, 49
  - collecting path between, 13
  - congested, finding of, 226
  - existing, visiting of, 35
  - infected, collecting all, 225
  - kinds of, 64
  - new, 36
  - virtual, creating of, 111
  - temporary, 34
- none, 94
- Not equal, 78
- Numbers, 63
- Observation
  - multipoint, 137
  - selected, 137
- Operations
  - elementary, 109
  - forward and backward, 106
  - local in doers, 109
  - spatial, more complex, 115
- or, 87
- ORDER, 68, 70
- orparallel, 87
- Other works, 27
  - out, 65
  - overhead, 7
- Overoperability, 2
- PAINT, 68, 72
- Pattern with
  - arbitrary links, 138
  - named and oriented links, 138
- Parallel
  - and distributed computing, 28
  - computing, 27
  - distributed machine, 1
- Parser, 102
- Patrol(ling), 208
  - by any number of robots, 211
  - by a single robot, 208
  - by two robots, 209
- Payload, adding
  - planting trees, 150
  - to CC implementation, 197
- Physical
  - location, moving into, 113
  - matter, 62
    - delivery and processing, 55, 167
    - transference, 112, 116
    - working with, 96
    - examples, 96
  - neighborhood, 192
  - world, 34
    - directly accessing, 235
    - nodes, temporary, 34
    - operating in, 235
    - parameters, accessing, 36
    - search, 171
- Places, 63
- Plans, future, 239
- Polygons, visiting, 175
- Predecessors, recorded, 13
- Problem(s) of
  - distributed implementation, 15
  - distribution, 6
  - managing distributed systems, 5
  - shortest path, 10
- Processor(s)
  - communication, 102
  - control, 101
  - operation, 102
- product, 94
- Programming
  - in a single doer, 123
  - in integration of worlds, 151
  - in multiple doers, 126
  - of virtual world, 130

- spatial, 29
    - dynamics of, 154
    - in WAVE-WP, 123
  - traditional, 123
- QUALITY, 68, 69
- Query, elementary, 22, 24
- Queue
  - incoming, 104
  - outgoing, 104
  - wave, 102
- quit, 92, 93
- Radar neighborhood
  - infrastructure, 201
- rake, 94
- random, 88
- Region, 35
  - patrol, 208, 209
- Related areas, 27
- release, 92, 93
- Remarks, final, 238
  - after, 239
- Remote
  - data, returning, 105
  - results, 53
  - variables, 54
- RESOURCES, 68, 73
- Resource(s)
  - management, hierarchical, 198
  - protecting common, 90
  - protection, 86
    - examples, 91
- Repetition, 86, 89
  - examples of, 89
- Ring, 190
- Road traffic management, 237
- Robotics
  - cooperative, massive, 29, 236
  - mobile, 29
- Robots assigning to
  - branches, 177
  - scenarios, 169
- Route(s), setting specific, 169
- Rule(s), 60, 85
  - autonomy, 92
  - examples, 93
  - branching, 86
  - coverage with, 50
  - echo, 93
    - examples, 94
    - use of, 149
  - forward, 86
  - in general, 85
  - using, 51
- Samples, map-based collection of, 181
- Scenario(s)
  - cleaning, 218
  - fusion-distribution, in WAVE-WP, 222
  - life support, 219
  - spatial, self-spreading, 10
  - state-checking, 217
- Search
  - combined solutions, 177
  - full-depth, 178
  - global, for next polygon, 176
  - of region, 153
  - regular random, 176
  - single-step, 175
- Security, global, 238
- Semantics, direct expression, 17
- Sequence, 87
- Shortage of vehicles, 118
- Shortest path
  - collection, 13
    - in WAVE-WP, 19
  - finding, full program, 20
  - problem, 10
  - tree finding, 11
    - in WAVE-WP, 17
- Sets of nodes reached (SNR), 49, 77
- Simulation, distributed interactive, 237
- Solution(s)
  - by two doers, 121
  - distributed, 5
  - localized, 5
  - more intelligent, required, 228
  - parallel, 11
  - sequential, 120
- sort, 94
- Space
  - cleaning scenarios, 174
  - modification, run time, 179
  - navigation, 49
    - parallel solution for, 119
- Spanning tree-based collection, 136
- Spatial
  - automaton, 9
  - dynamics, programming of, 154
  - operations, more complex, 115
  - programming, 29
    - in WAVE-WP, 123
- SPEED, 68, 70
- Speed, 44, 64
- Splitting, 84

- state, 94
- State-checking scenario, 217
- State(s), 65, 77
  - generalization procedure, 85
  - generation examples, 80
  - generator, 74, 79
  - resultant, 50
- start, 65
- Structuring
  - examples of, 61
  - with the use of rule, 61
- Subtasks, splitting into, 167
- Subtraction, 82
- sum, 94
  - using echo rule, 129
- Summation, using central doer, 128
- Synchronization, 86, 90,
  - adding, 168
  - example of, 90
- Syntax
  - compact, 243
  - extended, 241
- System(s)
  - intelligent, 3
  - large distributed, 5
  - management, 29
  - organization, as a function, 26
- Target fusion and distribution, 221
- thru, 65
- TIME, 68, 70
- Time, 44, 64
- Topologies, other
  - centralized, 187
  - chain, 187
  - ring, 187
- Track(s)
  - forest, 103
  - infrastructure, 106
  - moving data through, 116
  - network optimization, 107
  - processes, 108
  - run time creation, 107
- Tracking
  - aerial object, 202
  - simultaneous multiple, 203
- Traffic management
  - other tasks, 205
  - road and air, 237
- United world, 42
  - access to nodes, 43
  - dynamics, 44
  - observation, 153
  - planting trees in, 151
- USER, 68, 73
- VALUE, 68, 72
- Value,
  - combined, 50
  - resultant, 77
- Variable(s), 60, 66
  - environmental, 68, 103
  - frontal, 67, 103
  - nodal, 67, 103
- Vector(s), 66
  - acts special, 83
  - examples, 83
  - special, 81
  - summation
    - parallel, 125
    - sequential, 124
- Vehicles, dealing with shortage of, 118
- Virtual world, 38
  - distributed, creating, 172
  - guidance, under, 235
- Virus sources, inferring, 227
- wait, 90
- Wave(s), 33, 60
  - composition and structuring, 50
  - expressions and remote data, 53
  - forwarding suspended, 105
  - identities, 103
  - nature of, 47
  - new incoming, 105
  - parallel composition, 52
  - parallel-sequential composition, 52
  - passing through, 105
  - queue, 102
  - sequential composition, 51
  - suspended, 102
- WAVE-WP
  - advantages of using, 220
  - basic ideas, 8
  - distributed
    - interpretation, 99
    - interpreter, 234
  - high-level language, 234
  - interpreter architecture, 101
  - interpreters, universal, 16
  - (spatial) automaton, 9, 234
  - summary, 241–243
    - of the main features, 233–235
- WHERE, 68, 70
- Whole, 8, 233
  - first, 8

## World(s)

- and waves, 33
- distribution between doers, 46
- execution, 44
- further integration, 47
- physical, 34
  - broadcasting in, 37
  - directly operating in, 4
  - temporary nodes, 34
- processing language, 59
- virtual, 38
- creating, 130
- distributed
  - creating, 172
  - inference in, 137
- inhabiting with mobile entities, 132
- mobility in the execution
  - world, 139
- observation, 135
- openness, 134
- programming, 130
- united, 42

