

Keyword Name

A General Literature

A.0 General

A.0.a Biographies/Autobiographies

A.0.b Conference Proceedings

A.0.c General Literary Works

A.1 Introductory and Survey

A.2 Reference

A.m Miscellaneous

B Hardware

B.0 General

B.1 Control Structures and Microprogramming

B.1.0 General

B.1.1 Control Design Styles

B.1.1.a Hardwired control

B.1.1.b Microprogrammed logic arrays

B.1.1.c Writable control store

B.1.2 Control Structure Performance Analysis
and Design Aids

B.1.2.a Automatic synthesis

B.1.2.b Formal models

B.1.2.c Simulation

B.1.3 Control Structure Reliability, Testing, and
Fault-Tolerance

B.1.3.a Diagnostics

B.1.3.b Error-checking

B.1.3.c Redundant design

B.1.3.d Test generation

B.1.4 Microprogram Design Aids

B.1.4.a Firmware engineering

B.1.4.b Languages and compilers

B.1.4.c Machine-independent microcode
generation

B.1.4.d Optimization

B.1.4.e Verification

B.1.5 Microcode Applications

B.1.5.a Direct data manipulation

B.1.5.b Firmware support of operating
systems/instruction sets

B.1.5.c Instruction set interpretation

B.1.5.d Peripheral control

- B.1.5.e Special-purpose
- B.1.m Miscellaneous
 - B.1.m.a Emerging technologies
- B.2 Arithmetic and Logic Structures
 - B.2.0 General
 - B.2.1 Design Styles
 - B.2.1.a Calculator
 - B.2.1.b Parallel
 - B.2.1.c Pipeline
 - B.2.1.d Multiple valued logic
 - B.2.2 Performance Analysis and Design Aids
 - B.2.2.a Simulation
 - B.2.2.b Verification
 - B.2.2.c Worst-case analysis
 - B.2.3 Reliability, Testing, and Fault-Tolerance
 - B.2.3.a Diagnostics
 - B.2.3.b Error-checking
 - B.2.3.c Redundant design
 - B.2.3.d Test generation
 - B.2.4 High-Speed Arithmetic
 - B.2.4.a Algorithms
 - B.2.4.b Cost/performance
 - B.2.m Miscellaneous
- B.3 Memory Structures
 - B.3.0 General
 - B.3.1 Semiconductor Memories
 - B.3.1.a DRAM
 - B.3.1.b ROM
 - B.3.1.c SRAM
 - B.3.2 Design Styles
 - B.3.2.a Associative memories
 - B.3.2.b Cache memories
 - B.3.2.c Interleaved memories
 - B.3.2.d Mass storage
 - B.3.2.e Primary memory
 - B.3.2.f Sequential-access memory
 - B.3.2.g Shared memory
 - B.3.2.h Virtual memory
 - B.3.3 Performance Analysis and Design Aids
 - B.3.3.a Formal models
 - B.3.3.b Simulation
 - B.3.3.c Worst-case analysis

- B.3.4 Reliability, Testing, and Fault-Tolerance
 - B.3.4.a Diagnostics
 - B.3.4.b Error-checking
 - B.3.4.c Redundant design
 - B.3.4.d Test generation
 - B.3.m Miscellaneous
- B.4 I/O and Data Communications
 - B.4.0 General
 - B.4.1 Data Communications Devices
 - B.4.1.a Processors
 - B.4.1.b Receivers
 - B.4.1.c Transmitters
 - B.4.2 Input/Output Devices
 - B.4.2.a Channels and controllers
 - B.4.2.b Data terminals and printers
 - B.4.2.c Image display
 - B.4.2.d Voice
 - B.4.3 Interconnections (Subsystems)
 - B.4.3.a Asynchronous/synchronous operation
 - B.4.3.b Fiber optics
 - B.4.3.c Interfaces
 - B.4.3.d Parallel I/O
 - B.4.3.e Physical structures
 - B.4.3.f Topology
 - B.4.3.g Web technologies
 - B.4.3.h Wireless systems
 - B.4.4 Performance Analysis and Design Aids
 - B.4.4.a Formal models
 - B.4.4.b Simulation
 - B.4.4.c Verification
 - B.4.4.d Worst-case analysis
 - B.4.5 Reliability, Testing, and Fault-Tolerance
 - B.4.5.a Built-in tests
 - B.4.5.b Diagnostics
 - B.4.5.c Error-checking
 - B.4.5.d Hardware reliability
 - B.4.5.e Redundant design
 - B.4.5.f Test generation
 - B.4.m Miscellaneous
- B.5 Register-Transfer-Level Implementation
 - B.5.0 General
 - B.5.1 Design

- B.5.1.a Arithmetic and logic units
- B.5.1.b Control design
- B.5.1.c Data-path design
- B.5.1.d Memory design
- B.5.1.e Styles
- B.5.2 Design Aids
 - B.5.2.a Automatic synthesis
 - B.5.2.b Hardware description languages
 - B.5.2.c Optimization
 - B.5.2.d Simulation
 - B.5.2.e Verification
- B.5.3 Reliability and Testing
 - B.5.3.a Built-in tests
 - B.5.3.b Error-checking
 - B.5.3.c Redundant design
 - B.5.3.d Test generation
 - B.5.3.e Testability
- B.5.m Miscellaneous
- B.6 Logic Design
 - B.6.0 General
 - B.6.1 Design Styles
 - B.6.1.a Cellular arrays and automata
 - B.6.1.b Combinational logic
 - B.6.1.c Logic arrays
 - B.6.1.d Memory control and access
 - B.6.1.e Memory used as logic
 - B.6.1.f Parallel circuits
 - B.6.1.g Sequential circuits
 - B.6.2 Reliability and Testing
 - B.6.2.a Built-in tests
 - B.6.2.b Error-checking
 - B.6.2.c Redundant design
 - B.6.2.d Test generation
 - B.6.2.e Testability
 - B.6.3 Design Aids
 - B.6.3.a Automatic synthesis
 - B.6.3.b Hardware description languages
 - B.6.3.c Optimization
 - B.6.3.d Simulation
 - B.6.3.e Switching theory
 - B.6.3.f Verification
 - B.6.m Miscellaneous

- B.7 Integrated Circuits
 - B.7.0 General
 - B.7.1 Types and Design Styles
 - B.7.1.a Advanced technologies
 - B.7.1.b Algorithms implemented in hardware
 - B.7.1.c Gate arrays
 - B.7.1.d Input/output circuits
 - B.7.1.e Memory technologies
 - B.7.1.f Microprocessors and microcomputers
 - B.7.1.g Network connectivity chips
 - B.7.1.h Standard cells
 - B.7.1.i VLSI
 - B.7.2 Design Aids
 - B.7.2.a Graphics
 - B.7.2.b Layout
 - B.7.2.c Placement and routing
 - B.7.2.d Simulation
 - B.7.2.e Verification
 - B.7.3 Reliability and Testing
 - B.7.3.a Built-in tests
 - B.7.3.b Error-checking
 - B.7.3.c Fault injection
 - B.7.3.d Redundant design
 - B.7.3.e Test generation
 - B.7.3.f Testability
 - B.7.m Miscellaneous
- B.8 Performance and Reliability
 - B.8.0 General
 - B.8.1 Reliability, Testing, and Fault-Tolerance
 - B.8.2 Performance Analysis and Design Aids
 - B.8.m Miscellaneous
- B.9 Power Management
 - B.9.1 Low-power design
 - B.9.2 Energy-aware systems
 - B.9.3 Temperature-aware design
 - B.9.4 Design for power delivery limits
 - B.9.5 Design for voltage stability
 - B.m Miscellaneous
 - B.m.a Design management
- C Computer Systems Organization
 - C.0 General
 - C.0.a Emerging technologies

- C.0.b Hardware/software interfaces
- C.0.c Instruction set design
- C.0.d Modeling of computer architecture
- C.0.e System architectures, integration and modeling
- C.0.f Systems specification methodology
- C.1 Processor Architectures
 - C.1.0 General
 - C.1.1 Single Data Stream Architectures
 - C.1.1.a MISD processors
 - C.1.1.b Pipeline processors
 - C.1.1.c RISC/CISC, VLIW architectures
 - C.1.1.d SISD processors
 - C.1.1.e Von Neumann architectures
 - C.1.2 Multiple Data Stream Architectures (Multiprocessors)
 - C.1.2.a Array and vector processors
 - C.1.2.b Associative processors
 - C.1.2.c Connection machines
 - C.1.2.d Interconnection architectures
 - C.1.2.e Load balancing and task assignment
 - C.1.2.f MIMD processors
 - C.1.2.g Parallel processors
 - C.1.2.h Pipeline processors
 - C.1.2.i TC scheduling and synchronization
 - C.1.2.j SIMD processors
 - C.1.3 Other Architecture Styles
 - C.1.3.a Adaptable architectures
 - C.1.3.b Analog computers
 - C.1.3.c Capability architectures
 - C.1.3.d Cellular architecture
 - C.1.3.e Dataflow architectures
 - C.1.3.f Heterogeneous (hybrid) systems
 - C.1.3.g High-level language architectures
 - C.1.3.h Multithreaded processors
 - C.1.3.i Neural nets
 - C.1.3.j Neurocomputers
 - C.1.3.k Pipeline processors
 - C.1.3.l Stack-oriented processors
 - C.1.4 Parallel Architectures
 - C.1.4.a Distributed architectures
 - C.1.4.b Mobile processors

- C.1.4.c Real-time distributed
- C.1.4.d Scheduling and task partitioning
- C.1.4.e Multi-core/single-chip multiprocessors
- C.1.4.f Speculative multi-threading
- C.1.4.g On-chip interconnection networks
- C.1.5 Micro-architecture implementation considerations
 - C.1.5.a Instruction fetch
 - C.1.5.b Pipeline implementation
 - C.1.5.c Superscalar, dynamically-scheduled, and statically-scheduled implementation
 - C.1.5.d Support for multi-threaded execution
 - C.1.5.e Memory hierarchy
 - C.1.5.f Decoupled organizations
 - C.1.5.g Physically aware micro-architecture: power, thermal, impact of technology trends, etc.
 - C.1.5.h Support for reliability
 - C.1.5.i Support for dynamic compilation
 - C.1.5.j Support for security
- C.1.m Miscellaneous
 - C.1.m.a Analog computers
 - C.1.m.b Hybrid systems
- C.2 Communication/Networking and Information Technology
 - C.2.0 General
 - C.2.0.a Architecture
 - C.2.0.b Data communications
 - C.2.0.c Emerging technologies
 - C.2.0.d Infrastructure protection
 - C.2.0.e Interprocessor communications
 - C.2.0.f Network-level security and protection
 - C.2.0.g OSI reference model
 - C.2.0.h Standards
 - C.2.1 Network Architecture and Design
 - C.2.1.a ATM
 - C.2.1.b Centralized networks
 - C.2.1.c Circuit-switching networks
 - C.2.1.d Distributed networks
 - C.2.1.e Frame relay networks
 - C.2.1.f ISDN
 - C.2.1.g Network communications

- C.2.1.h Network topology
- C.2.1.i Packet-switching networks
- C.2.1.j Store and forward networks
- C.2.1.k Wireless communication
- C.2.2 Network Protocols
 - C.2.2.a Applications
 - C.2.2.b Protocol architecture
 - C.2.2.c Protocol verification
 - C.2.2.d Routing protocols
- C.2.3 Network Operations
 - C.2.3.a Network management
 - C.2.3.b Network monitoring
 - C.2.3.c Public networks
- C.2.4 Distributed Systems
 - C.2.4.a Client/server
 - C.2.4.b Distributed applications
 - C.2.4.c Distributed databases
 - C.2.4.d Network operating systems
- C.2.5 Local-Area Networks
 - C.2.5.a Access schemes
 - C.2.5.b Buses
 - C.2.5.c Ethernet
 - C.2.5.d High-speed
 - C.2.5.e Internet
 - C.2.5.f Token rings
- C.2.6 Internetworking
 - C.2.6.a Bridges
 - C.2.6.b Gateways
 - C.2.6.c Multicast
 - C.2.6.d Protocols
 - C.2.6.e Routers
 - C.2.6.f Standards
- C.2.7 Wide-area networks
 - C.2.7.a CATV
 - C.2.7.b Optical fiber
 - C.2.7.c Sensor networks
 - C.2.7.d Telephony
 - C.2.7.e Wireless
- C.2.8 Mobile Computing
 - C.2.8.a Algorithm/protocol design and analysis
 - C.2.8.b Architectures
 - C.2.8.c Mobile communication systems

- C.2.8.d Mobile environments
- C.2.8.e Support services
- C.2.m Miscellaneous
- C.3 Special-Purpose and Application-Based Systems
 - C.3.a Application studies resulting in better multiple-processor systems
 - C.3.b Microprocessor/microcomputer applications
 - C.3.c Process control systems
 - C.3.d Real-time and embedded systems
 - C.3.e Reconfigurable hardware
 - C.3.f Signal processing systems
 - C.3.g Smartcards
 - C.3.h Ubiquitous computing
- C.4 Performance of Systems
 - C.4.a Design studies
 - C.4.b Fault tolerance
 - C.4.c Measurement techniques
 - C.4.d Modeling techniques
 - C.4.e Performance attributes
 - C.4.f Reliability, availability, and serviceability
 - C.4.g Measurement, evaluation, modeling, simulation of multiple-processor systems
- C.5 Computer System Implementation
 - C.5.0 General
 - C.5.1 Large and Medium (“Mainframe”) Computers
 - C.5.1.a Super (very large) computers
 - C.5.2 Minicomputers
 - C.5.3 Microcomputers
 - C.5.3.a Microprocessors
 - C.5.3.b Personal computers
 - C.5.3.c Portable devices
 - C.5.3.d Workstations
 - C.5.4 VLSI Systems
 - C.5.4.a Impact of VLSI on system design
 - C.5.5 Servers
 - C.5.5.a Web server
 - C.5.5.b Web browser
 - C.5.6 Multiprocessor Systems
 - C.5.7 Wearable Computers

- C.5.m Miscellaneous
- D Software/Software Engineering
 - D.0 General
 - D.1 Programming Techniques
 - D.1.0 General
 - D.1.1 Applicative (Functional) Programming
 - D.1.2 Automatic Programming
 - D.1.3 Concurrent Programming
 - D.1.4 Sequential Programming
 - D.1.5 Object-Oriented Programming
 - D.1.6 Logic Programming
 - D.1.7 Visual Programming
 - D.1.8 Distributed programming
 - D.1.m Miscellaneous
 - D.2 Software Engineering
 - D.2.0 General
 - D.2.0.a Protection mechanisms
 - D.2.0.b Software psychology
 - D.2.0.c Software engineering for Internet projects
 - D.2.0.d Standards
 - D.2.0.e Surveys of historical development of one particular area
 - D.2.1 Requirements/Specifications
 - D.2.1.a Analysis
 - D.2.1.b Elicitation methods
 - D.2.1.c Languages
 - D.2.1.d Management
 - D.2.1.e Methodologies
 - D.2.1.f Process
 - D.2.1.g Specification
 - D.2.1.h Tools
 - D.2.1.i Validation
 - D.2.2 Design Tools and Techniques
 - D.2.2.a CASE
 - D.2.2.b Decision tables
 - D.2.2.c Distributed/Internet based software engineering tools and techniques
 - D.2.2.d Modules and interfaces
 - D.2.2.e Programmer workbench
 - D.2.3 Coding Tools and Techniques
 - D.2.3.a Object-oriented programming

- D.2.3.b Pretty printers
- D.2.3.c Program editors
- D.2.3.d Reentrant code
- D.2.3.e Standards
- D.2.3.f Structured programming
- D.2.3.g Top-down programming
- D.2.4 Software/Program Verification
 - D.2.4.a Assertion checkers, assertion languages, performance
 - D.2.4.b Class invariants
 - D.2.4.c Correctness proofs
 - D.2.4.d Formal methods
 - D.2.4.e Model checking
 - D.2.4.f Programming by contract
 - D.2.4.g Reliability
 - D.2.4.h Statistical methods
 - D.2.4.i Validation
- D.2.5 Testing and Debugging
 - D.2.5.a Code inspections and walkthroughs
 - D.2.5.b Debugging aids
 - D.2.5.c Diagnostics
 - D.2.5.d Distributed debugging
 - D.2.5.e Dumps
 - D.2.5.f Error handling and recovery
 - D.2.5.g Monitors
 - D.2.5.h Reliability
 - D.2.5.i Symbolic execution
 - D.2.5.j Test levels
 - D.2.5.k Testing strategies
 - D.2.5.l Test design
 - D.2.5.m Test coverage of code
 - D.2.5.n Test coverage of specifications
 - D.2.5.o Test execution
 - D.2.5.p Test documentation
 - D.2.5.q Test management
 - D.2.5.r Testing tools
 - D.2.5.s Tracing
 - D.2.5.t Usability testing
- D.2.6 Programming Environments/Construction Tools
 - D.2.6.a Environments for multiple-processor systems

- D.2.6.b Graphical environments
- D.2.6.c Integrated environments
- D.2.6.d Interactive environments
- D.2.6.e Programmer workbench
- D.2.7 Distribution, Maintenance, and Enhancement
 - D.2.7.a Conversion from sequential to parallel forms
 - D.2.7.b Corrections
 - D.2.7.c Documentation
 - D.2.7.d Enhancement
 - D.2.7.e Evolving Internet applications
 - D.2.7.f Extensibility
 - D.2.7.g Maintainability
 - D.2.7.h Maintenance management
 - D.2.7.i Maintenance measurement
 - D.2.7.j Maintenance planning
 - D.2.7.k Maintenance process
 - D.2.7.l Portability
 - D.2.7.m Restructuring, reverse engineering, and reengineering
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- D.2.8 Metrics/Measurement
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 - D.2.8.b Performance measures
 - D.2.8.c Process metrics
 - D.2.8.d Product metrics
 - D.2.8.e Software science
- D.2.9 Management
 - D.2.9.a Copyrights
 - D.2.9.b Cost estimation
 - D.2.9.c Enactment
 - D.2.9.d Initiation and scope definition
 - D.2.9.e Organizational management and coordination
 - D.2.9.f Planning
 - D.2.9.g Postclosure activities
 - D.2.9.h Productivity
 - D.2.9.i Programming teams
 - D.2.9.j Project close out
 - D.2.9.k Project control & modeling
 - D.2.9.l Review and evaluation

- D.2.9.m Risk management
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- D.2.9.o Software acquisition
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- D.2.10 Design
 - D.2.10.a Design concepts
 - D.2.10.b Design notations and documentation
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 - D.2.10.d State diagrams
 - D.2.10.e Evolutionary prototyping
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 - D.2.10.i Rapid prototyping
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- D.2.11 Software Architectures
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 - D.2.11.b Domain-specific architectures
 - D.2.11.c Information hiding
 - D.2.11.d Languages
 - D.2.11.e Patterns
- D.2.12 Interoperability
 - D.2.12.a Data mapping
 - D.2.12.b Distributed objects
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- D.2.13 Reusable Software
 - D.2.13.a Domain engineering
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 - D.2.13.c Reuse models
- D.2.14 Human Factors in Software Design
 - D.2.14.a User interfaces
- D.2.15 Software and System Safety
- D.2.16 Configuration Management
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 - D.2.16.e Configuration status accounting
 - D.2.16.f Software release management and delivery
- D.2.17 Software Construction
 - D.2.17.a Construction planning

- D.2.17.b Code design
- D.2.17.c Code tuning
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- D.2.17.f Source code organization
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- D.2.17.h Construction QA
- D.2.17.i Programming paradigms
- D.2.17.j System integration and implementation
- D.2.18 Software Engineering Process
 - D.2.18.a Life cycle
 - D.2.18.b Process infrastructure
 - D.2.18.c Process measurement
 - D.2.18.d Process definition
 - D.2.18.e Software process models
 - D.2.18.f Qualitative process analysis
 - D.2.18.g Process implementation and change
- D.2.19 Software Quality/SQA
 - D.2.19.a Quality concepts
 - D.2.19.b Planning for SQA and V&V
 - D.2.19.c Methods for SQA and V&V
 - D.2.19.d Measurement applied to SQA and V&V
- D.2.m Miscellaneous
 - D.2m.a Software libraries
 - D.2m.b System issues
- D.3 Programming Languages
 - D.3.0 General
 - D.3.0.a Standards
 - D.3.1 Formal Definitions and Theory
 - D.3.1.a Semantics
 - D.3.1.b Syntax
 - D.3.2 Language Classifications
 - D.3.2.a Applicative (functional) languages
 - D.3.2.b Componentware
 - D.3.2.c Compression technologies
 - D.3.2.d Concurrent, distributed, and parallel languages
 - D.3.2.e Constraint and logic languages
 - D.3.2.f Dataflow languages
 - D.3.2.g Design languages
 - D.3.2.h Development tools

- D.3.2.i Extensible languages
- D.3.2.j Java
- D.3.2.k Macro and assembly languages
- D.3.2.l Microprogramming languages
- D.3.2.m Multiparadigm languages
- D.3.2.n Nondeterministic languages
- D.3.2.o Nonprocedural languages
- D.3.2.p Object-oriented languages
- D.3.2.q Query languages
- D.3.2.r Scripting languages
- D.3.2.s Specialized application languages
- D.3.2.t Very high-level languages
- D.3.3 Language Constructs and Features
 - D.3.3.a Abstract data types
 - D.3.3.b Classes and objects
 - D.3.3.c Concurrent programming structures
 - D.3.3.d Constraints
 - D.3.3.e Control structures
 - D.3.3.f Coroutines
 - D.3.3.g Data types and structures
 - D.3.3.h Distributed objects, components, containers
 - D.3.3.i Dynamic storage management
 - D.3.3.j Frameworks
 - D.3.3.k Inheritance
 - D.3.3.l Input/output
 - D.3.3.m Modules, packages
 - D.3.3.n Patterns
 - D.3.3.o Polymorphism
 - D.3.3.p Procedures, functions, and subroutines
 - D.3.3.q Recursion
- D.3.4 Processors
 - D.3.4.a Code generation
 - D.3.4.b Compilers
 - D.3.4.c Debuggers
 - D.3.4.d Incremental compilers
 - D.3.4.e Interpreters
 - D.3.4.f Memory management
 - D.3.4.g Optimization
 - D.3.4.h Parsing
 - D.3.4.i Preprocessors
 - D.3.4.j Retargetable compilers

- D.3.4.k Runtime environments
- D.3.4.l Translator writing systems and compiler generators
- D.3.m Miscellaneous
- D.4 Operating Systems
 - D.4.0 General
 - D.4.1 Process Management
 - D.4.1.a Concurrency
 - D.4.1.b Deadlocks
 - D.4.1.c Multiprocessing/multiprogramming/multitaskin
 - D.4.1.d Mutual exclusion
 - D.4.1.e Scheduling
 - D.4.1.f Synchronization
 - D.4.1.g Threads
 - D.4.2 Storage Management
 - D.4.2.a Allocation/deallocation strategies
 - D.4.2.b Distributed memories
 - D.4.2.c Garbage collection
 - D.4.2.d Main memory
 - D.4.2.e Secondary storage
 - D.4.2.f Segmentation
 - D.4.2.g Storage hierarchies
 - D.4.2.h Swapping
 - D.4.2.i Virtual memory
 - D.4.3 File Systems Management
 - D.4.3.a Access methods
 - D.4.3.b Directory structures
 - D.4.3.c Distributed file systems
 - D.4.3.d File organization
 - D.4.3.e Maintenance
 - D.4.4 Communications Management
 - D.4.4.a Buffering
 - D.4.4.b Input/output
 - D.4.4.c Message sending
 - D.4.4.d Network communication
 - D.4.4.e Terminal management
 - D.4.5 Reliability
 - D.4.5.a Backup procedures
 - D.4.5.b Checkpoint/restart
 - D.4.5.c Disconnected operation
 - D.4.5.d Fault-tolerance

- D.4.5.e High availability
- D.4.5.f Verification
- D.4.6 Security and Privacy Protection
 - D.4.6.a Access controls
 - D.4.6.b Authentication
 - D.4.6.c Cryptographic controls
 - D.4.6.d Information flow controls
 - D.4.6.e Invasive software
 - D.4.6.f Security kernels
 - D.4.6.g Verification
- D.4.7 Organization and Design
 - D.4.7.a Batch processing systems
 - D.4.7.b Distributed systems
 - D.4.7.c Hierarchical design
 - D.4.7.d Interactive systems
 - D.4.7.e Real-time systems and embedded systems
 - D.4.7.f Parallel systems
- D.4.8 Performance
 - D.4.8.a Measurements
 - D.4.8.b Modeling and prediction
 - D.4.8.c Monitors
 - D.4.8.d Operational analysis
 - D.4.8.e Queuing theory
 - D.4.8.f Simulation
 - D.4.8.g Stochastic analysis
- D.4.9 Systems Programs and Utilities
 - D.4.9.a Command and control languages
 - D.4.9.b Linkers
 - D.4.9.c Loaders
 - D.4.9.d Window managers
- D.4.1.0 Support for Adaptation
 - D.4.1.0.a Application-aware adaptation
 - D.4.1.0.b Application-transparent adaptation
 - D.4.1.0.c Fidelity, agility, and stability
 - D.4.1.0.d Low-bandwidth operation
 - D.4.1.0.e Transcoding
- D.4.m Miscellaneous
- E Data
 - E.0 General
 - E.0.a Data communications aspects
 - E.0.b Data dependencies

- E.0.c Data encryption
- E.0.d File organization
- E.0.e Knowledge and data engineering tools and techniques
- E.0.f System applications and experience
- E.1 Data Structures
 - E.1.a Arrays
 - E.1.b Distributed data structures
 - E.1.c Distributed file systems
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 - E.1.e Lists, stacks, and queues
 - E.1.f Records
 - E.1.g Tables
 - E.1.h Trees
- E.2 Data Storage Representations
 - E.2.a Composite structures
 - E.2.b Contiguous representations
 - E.2.c Hash-table representations
 - E.2.d Linked representations
 - E.2.e Object representation
 - E.2.f Primitive data items
- E.3 Data Encryption
 - E.3.a Code breaking
 - E.3.b DES
 - E.3.c Public key cryptosystems
 - E.3.d Standards
- E.4 Coding and Information Theory
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 - E.4.b Error control codes
 - E.4.c Normal models of communication
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- E.5 Files
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- E.m Miscellaneous
- F Theory of Computation
 - F.0 General
 - F.1 Computation by Abstract Devices
 - F.1.0 General
 - F.1.1 Models of Computation

- F.1.1.a Automata
- F.1.1.b Bounded-action devices
- F.1.1.c Computability theory
- F.1.1.d Relations between models
- F.1.1.e Self-modifying machines
- F.1.1.f Unbounded-action devices
- F.1.2 Modes of Computation
 - F.1.2.a Alternation and nondeterminism
 - F.1.2.b Interactive and reactive computation
 - F.1.2.c Online computation
 - F.1.2.d Parallelism and concurrency
 - F.1.2.e Probabilistic computation
 - F.1.2.f Relations among modes
 - F.1.2.g Relativized computation
- F.1.3 Complexity Measures and Classes
 - F.1.3.a Complexity hierarchies
 - F.1.3.b Machine-independent complexity
 - F.1.3.c Reducibility and completeness
 - F.1.3.d Relations among complexity classes
 - F.1.3.e Relations among complexity measures
- F.1.m Miscellaneous
- F.2 Analysis of Algorithms and Problem Complexity
 - F.2.0 General
 - F.2.1 Numerical Algorithms and Problems
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 - F.2.1.b Computations in finite fields
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 - F.2.2 Nonnumerical Algorithms and Problems
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 - F.2.2.d Pattern matching
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 - F.2.3 Tradeoffs between Complexity Measures
 - F.2.m Miscellaneous

- F.3 Logics and Meanings of Programs
 - F.3.0 General
 - F.3.1 Specifying and Verifying and Reasoning about Programs
 - F.3.1.a Assertions
 - F.3.1.b Invariants
 - F.3.1.c Logics of programs
 - F.3.1.d Mechanical verification
 - F.3.1.e Pre- and post-conditions
 - F.3.1.f Specification techniques
 - F.3.2 Semantics of Programming Languages
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 - F.3.2.b Denotational semantics
 - F.3.2.c Operational semantics
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- F.4 Mathematical logic and Formal Languages
 - F.4.0 General
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 - F.4.1.a Computability theory
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 - F.4.1.c Lambda calculus and related systems
 - F.4.1.d Logic and constraint programming
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 - F.4.2 Grammars and Other Rewriting Systems
 - F.4.2.a Decision problems
 - F.4.2.b Grammar types
 - F.4.2.c Parallel rewriting systems

- F.4.2.d Parsing
- F.4.2.e Thue systems
- F.4.3 Formal Languages
 - F.4.3.a Algebraic language theory
 - F.4.3.b Classes defined by grammars or automata
 - F.4.3.c Classes defined by resource-bounded automata
 - F.4.3.d Decision problems
 - F.4.3.e Operations on languages
- F.4.m Miscellaneous
- F.m Miscellaneous
- G Mathematics of Computing
 - G.0 General
 - G.1 Numerical Analysis
 - G.1.0 General
 - G.1.0.a Computer arithmetic
 - G.1.0.b Conditioning and ill-conditioning
 - G.1.0.c Error analysis
 - G.1.0.d Interval arithmetic
 - G.1.0.e Multiple precision arithmetic
 - G.1.0.f Numerical algorithms
 - G.1.0.g Parallel algorithms
 - G.1.0.h Stability and instability
 - G.1.1 Interpolation
 - G.1.1.a Difference formulas
 - G.1.1.b Extrapolation
 - G.1.1.c Interpolation formulas
 - G.1.1.d Smoothing
 - G.1.1.e Spline and piecewise polynomial interpolation
 - G.1.2 Approximation
 - G.1.2.a Approximation of surfaces and contours

 - G.1.2.b Chebyshev approximation and theory
 - G.1.2.c Elementary function approximation
 - G.1.2.d Fast Fourier transforms
 - G.1.2.e Least squares approximation
 - G.1.2.f Linear approximation
 - G.1.2.g Minimax approximation and algorithms
 - G.1.2.h Nonlinear approximation
 - G.1.2.i Rational approximation

- G.1.2.j Special function approximations
- G.1.2.k Spline and piecewise polynomial approximation
 - G.1.2.l Wavelets and fractals
- G.1.3 Numerical Linear Algebra
 - G.1.3.a Conditioning
 - G.1.3.b Determinants
 - G.1.3.c Eigenvalues and eigenvectors
 - G.1.3.d Error analysis
 - G.1.3.e Linear systems
 - G.1.3.f Matrix inversion
 - G.1.3.g Pseudoinverses
 - G.1.3.h Singular value decomposition
 - G.1.3.i Sparse, structured, and very large systems
- G.1.4 Quadrature and Numerical Differentiation
 - G.1.4.a Adaptive and iterative quadrature
 - G.1.4.b Automatic differentiation
 - G.1.4.c Equal interval integration
 - G.1.4.d Error analysis
 - G.1.4.e Finite difference methods
 - G.1.4.f Gaussian quadrature
 - G.1.4.g Iterative methods
 - G.1.4.h Multidimensional (multiple) quadrature
- G.1.5 Roots of Nonlinear Equations
 - G.1.5.a Continuation (homotopy) methods
 - G.1.5.b Convergence
 - G.1.5.c Error analysis
 - G.1.5.d Iterative methods
 - G.1.5.e Polynomials, methods for
 - G.1.5.f Systems of equations
- G.1.6 Optimization
 - G.1.6.a Constrained optimization
 - G.1.6.b Convex programming
 - G.1.6.c Global optimization
 - G.1.6.d Gradient methods
 - G.1.6.e Inter programming
 - G.1.6.f Least squares methods
 - G.1.6.g Linear programming
 - G.1.6.h Nonlinear programming
 - G.1.6.i Quadratic programming methods

- G.1.6.j Simulated annealing
- G.1.6.k Stochastic programming
- G.1.6.l Unconstrained optimization
- G.1.7 Ordinary Differential Equations
 - G.1.7.a Boundary value problems
 - G.1.7.b Chaotic systems
 - G.1.7.c Convergence and stability
 - G.1.7.d Differential-algebraic equations
 - G.1.7.e Error analysis
 - G.1.7.f Finite difference methods
 - G.1.7.g Initial value problems
 - G.1.7.h Multistep and multivalued methods
 - G.1.7.i One-step (single step) methods
 - G.1.7.j Stiff equations
- G.1.8 Partial Differential Equations
 - G.1.8.a Domain decomposition methods
 - G.1.8.b Elliptic equations
 - G.1.8.c Finite difference methods
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 - G.1.8.f Hyperbolic equations
 - G.1.8.g Inverse problems
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 - G.1.8.k Parabolic equations
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- G.1.9 Integral Equations
 - G.1.9.a Delay equations
 - G.1.9.b Fredholm equations
 - G.1.9.c Integro-differential equations
 - G.1.9.d Volterra equations
- G.1.10 Applications
- G.1.m Miscellaneous
- G.2 Discrete Mathematics
 - G.2.0 General
 - G.2.1 Combinatorics
 - G.2.1.a Combinatorial algorithms
 - G.2.1.b Counting problems
 - G.2.1.c Generating functions
 - G.2.1.d Permutations and combinations
 - G.2.1.e Recurrences and difference equations

- G.2.2 Graph Theory
 - G.2.2.a Graph algorithms
 - G.2.2.b Graph labeling
 - G.2.2.c Hypergraphs
 - G.2.2.d Network problems
 - G.2.2.e Path and circuit problems
 - G.2.2.f Trees
- G.2.3 Applications
- G.2.m Miscellaneous
- G.3 Probability and Statistics
 - G.3.a Contingency table analysis
 - G.3.b Correlation and regression analysis
 - G.3.c Distribution functions
 - G.3.d Experimental design
 - G.3.e Markov processes
 - G.3.f Multivariate statistics
 - G.3.g Nonparametric statistics
 - G.3.h Probabilistic algorithms
 - G.3.i Queuing theory
 - G.3.j Random number generation
 - G.3.k Reliability and life testing
 - G.3.l Renewal theory
 - G.3.m Robust regression
 - G.3.n Statistical computing
 - G.3.o Statistical software
 - G.3.p Stochastic processes
 - G.3.q Survival analysis
 - G.3.r Time series analysis
- G.4 Mathematical Software
 - G.4.a Algorithm design and analysis
 - G.4.b Certification and testing
 - G.4.c Documentation
 - G.4.d Efficiency
 - G.4.e Parallel and vector implementations
 - G.4.f Portability
 - G.4.g Reliability and robustness
 - G.4.h User interfaces
 - G.4.i Verification
- G.m Miscellaneous
 - G.m.a Queuing theory
- H Information Technology and Systems
 - H.0 General

- H.0.a Infrastructure Protection
- H.1 Models and Principles
 - H.1.0 General
 - H.1.1 Systems and Information Theory
 - H.1.1.a General systems theory
 - H.1.1.b Information theory
 - H.1.1.c Value of information
 - H.1.2 User/Machine Systems
 - H.1.2.a Human factors
 - H.1.2.b Human-centered computing
 - H.1.2.c Human information processing
 - H.1.2.d Software psychology
 - H.1.m Miscellaneous
 - H.2 Database Management
 - H.2.0 General
 - H.2.0.a Security, integrity, and protection
 - H.2.0.b Database design, modeling and management
 - H.2.0.c Query design and implementation languages
 - H.2.1 Logical Design
 - H.2.1.a Data models
 - H.2.1.b Database architectures
 - H.2.1.c Database integration
 - H.2.1.d Database models
 - H.2.1.e Normal forms
 - H.2.1.f Schema and subschema
 - H.2.2 Physical Design
 - H.2.2.a Access methods
 - H.2.2.b Deadlock avoidance
 - H.2.2.c Indexing methods
 - H.2.2.d Physical database design prototypes
 - H.2.2.e Recovery and restart
 - H.2.3 Languages
 - H.2.3.a Data description languages
 - H.2.3.b Data manipulation languages
 - H.2.3.c Database (persistent) programming languages
 - H.2.3.d Database semantics
 - H.2.3.e Query languages
 - H.2.3.f Report writers
 - H.2.4 Systems

- H.2.4.a Active databases
- H.2.4.b Buffer management
- H.2.4.c Concurrency
- H.2.4.d Distributed databases
- H.2.4.e Multimedia databases
- H.2.4.f Object-oriented databases
- H.2.4.g Parallel databases
- H.2.4.h Query processing
- H.2.4.i Relational databases
- H.2.4.j Rule-based databases
- H.2.4.k Spatial databases
- H.2.4.l Statistical databases
- H.2.4.m Temporal databases
- H.2.4.n Textual databases
- H.2.4.o Transaction processing
- H.2.4.p Workflow management
- H.2.5 Heterogeneous Databases
 - H.2.5.a Data translation
 - H.2.5.b Program translation
- H.2.6 Database Machines
- H.2.7 Database Administration
 - H.2.7.a Data dictionary/directory
 - H.2.7.b Data warehouse and repository
 - H.2.7.c Logging and recovery
 - H.2.7.d Security, integrity, and protection
- H.2.8 Database Applications
 - H.2.8.a Bioinformatics (genome or protein) databases
 - H.2.8.b Clustering, classification, and association rules
 - H.2.8.c Data and knowledge visualization
 - H.2.8.d Data mining
 - H.2.8.e Feature extraction or construction
 - H.2.8.f Knowledge management applications
 - H.2.8.g Image databases
 - H.2.8.h Interactive data exploration and discovery
 - H.2.8.i Mining methods and algorithms
 - H.2.8.j Modeling structured, textual and multimedia data
 - H.2.8.k Personalization
 - H.2.8.l Text mining

- H.2.8.m Web mining
- H.2.8.n Scientific databases
- H.2.8.o Spatial databases and GIS
- H.2.8.p Statistical databases
- H.2.m Miscellaneous
- H.3 Information Storage and Retrieval
 - H.3.0 General
 - H.3.0.a Web Search
 - H.3.1 Content Analysis and Indexing
 - H.3.1.a Abstracting methods
 - H.3.1.b Dictionaries
 - H.3.1.c Indexing methods
 - H.3.1.d Linguistic processing
 - H.3.1.e Thesauruses
 - H.3.2 Information Storage
 - H.3.2.a Document/file management
 - H.3.2.b File organization
 - H.3.2.c Record classification
 - H.3.2.d Storage/repositories
 - H.3.3 Information Search and Retrieval
 - H.3.3.a Clustering
 - H.3.3.b Information filtering
 - H.3.3.c Internet search
 - H.3.3.d Metadata
 - H.3.3.e Query formulation
 - H.3.3.f Relevance feedback
 - H.3.3.g Retrieval models
 - H.3.3.h Search process
 - H.3.3.i Selection process
 - H.3.4 Systems and Software
 - H.3.4.a Current awareness systems
 - H.3.4.b Distributed systems
 - H.3.4.c Information networks
 - H.3.4.d Performance evaluation
 - H.3.4.e Question-answering systems
 - H.3.4.f User profiles and alert services
 - H.3.5 Online Information Services
 - H.3.5.a Commercial services
 - H.3.5.b Data sharing
 - H.3.5.c DOM
 - H.3.5.d HTML/DHTML CSS
 - H.3.5.e Web-based services

- H.3.5.f XML/XSL/RDF
- H.3.6 Library Automation
 - H.3.6.a Large text archives
- H.3.7 Digital Libraries
 - H.3.7.a Collection
 - H.3.7.b Dissemination
 - H.3.7.c Standards
 - H.3.7.d Systems issues
 - H.3.7.e User issues
- H.3.m Miscellaneous
- H.4 Information Technology and Systems
 - Applications
 - H.4.0 General
 - H.4.1 Office Automation
 - H.4.1.a Desktop publishing
 - H.4.1.b Equipment
 - H.4.1.c Groupware
 - H.4.1.d Spreadsheets
 - H.4.1.e Time management
 - H.4.1.f Word processing
 - H.4.1.g Workflow management
 - H.4.2 Types of Systems
 - H.4.2.a Decision support
 - H.4.2.b Logistics
 - H.4.3 Communications Applications
 - H.4.3.a Bulletin boards
 - H.4.3.b Computer conferencing, teleconferencing, and videoconferencing
 - H.4.3.c Electronic mail
 - H.4.3.d Information browsers
 - H.4.3.e Videotex
 - H.4m Miscellaneous
- H.5 Information Interfaces and Representation (HCI)
 - H.5.0 General
 - H.5.1 Multimedia Information Systems
 - H.5.1.a Animations
 - H.5.1.b Artificial, augmented, and virtual realities
 - H.5.1.c Audio input/output
 - H.5.1.d Evaluation/methodology
 - H.5.1.e Hypertext navigation and maps

- H.5.1.f Image/video retrieval
- H.5.1.g Video
- H.5.2 User Interfaces
 - H.5.2.a Auditory (non-speech) feedback
 - H.5.2.b Benchmarking
 - H.5.2.c Design for wearability
 - H.5.2.d Ergonomics
 - H.5.2.e Evaluation/methodology
 - H.5.2.f Graphical user interfaces
 - H.5.2.g Haptic I/O
 - H.5.2.h Input devices and strategies
 - H.5.2.i Interaction styles
 - H.5.2.j Natural language
 - H.5.2.k Prototyping
 - H.5.2.l Screen design
 - H.5.2.m Standardization
 - H.5.2.n Style guides
 - H.5.2.o Theory and methods
 - H.5.2.p Training, help, and documentation
 - H.5.2.q User-centered design
 - H.5.2.r User interface management systems
 - H.5.2.s Vision I/O
 - H.5.2.t Voice I/O
 - H.5.2.u Windowing systems
- H.5.3 Group and Organization Interfaces
 - H.5.3.a Asynchronous interaction
 - H.5.3.b Collaborative computing
 - H.5.3.c Computer-supported cooperative work

 - H.5.3.d Evaluation/methodology
 - H.5.3.e Organizational design
 - H.5.3.f Synchronous interaction
 - H.5.3.g Theory and models
 - H.5.3.h Web-based interaction
- H.5.4 Hypertext/Hypermedia
 - H.5.4.a Architectures
 - H.5.4.b Navigation
 - H.5.4.c Theory
 - H.5.4.d User issues
- H.5.5 Sound and Music Computing
 - H.5.5.a Methodologies and techniques
 - H.5.5.b Modeling

- H.5.5.c Signal analysis, synthesis, and processing
- H.5.5.d Systems
- H.5.m Miscellaneous
- H.m Miscellaneous
- I Computing Methodologies
 - I.0 General
 - I.1 Symbolic and algebraic manipulation
 - I.1.0 General
 - I.1.1 Expressions and Their Representation
 - I.1.1.a Representations
 - I.1.1.b Simplification of expressions
 - I.1.2 Algorithms
 - I.1.2.a Algebraic algorithms
 - I.1.2.b Algorithms for data and knowledge management
 - I.1.2.c Analysis of algorithms
 - I.1.2.d Nonalgebraic algorithms
 - I.1.2.e Performance evaluation of algorithms and systems
 - I.1.3 Languages and Systems
 - I.1.3.a Evaluation strategies
 - I.1.3.b Nonprocedural languages
 - I.1.3.c Special-purpose algebraic systems
 - I.1.3.d Special-purpose hardware
 - I.1.3.e Substitution mechanisms
 - I.1.4 Applications
 - I.1.m Miscellaneous
 - I.2 Artificial Intelligence
 - I.2.0 General
 - I.2.0.a Cognitive simulation
 - I.2.0.b Philosophical foundations
 - I.2.1 Applications and Expert Knowledge-Intensive Systems
 - I.2.1.a Cartography
 - I.2.1.b Computer vision
 - I.2.1.c Decision support
 - I.2.1.d Education
 - I.2.1.e Environment
 - I.2.1.f Games and infotainment
 - I.2.1.g Industrial automation
 - I.2.1.h Law

- I.2.1.i Mathematics
- I.2.1.j Medicine and science
- I.2.1.k Military
- I.2.1.l Natural language interfaces
- I.2.1.m Office automation
- I.2.1.n Space
- I.2.1.o Transportation
- I.2.2 Automatic Programming
 - I.2.2.a Automatic analysis of algorithms
 - I.2.2.b Program modification
 - I.2.2.c Program synthesis
 - I.2.2.d Program transformation
 - I.2.2.e Program verification
- I.2.3 Deduction and Theorem Proving and Knowledge Processing
 - I.2.3.a Answer/reason extraction
 - I.2.3.b Constraint-based processing
 - I.2.3.c Deduction
 - I.2.3.d Inference engines
 - I.2.3.e Logic processing
 - I.2.3.f Logic programming
 - I.2.3.g Mathematical induction
 - I.2.3.h Metatheory
 - I.2.3.i Nonmonotonic reasoning and belief revision
 - I.2.3.j Resolution
 - I.2.3.k Rule-based processing
 - I.2.3.l Uncertainty, “fuzzy,” and probabilistic reasoning
- I.2.4 Knowledge Representation Formalisms and Methods
 - I.2.4.a Agent communication languages
 - I.2.4.b Distributed representations
 - I.2.4.c Frames and scripts
 - I.2.4.d Knowledge base management
 - I.2.4.e Knowledge base verification
 - I.2.4.f Modal logic
 - I.2.4.g Predicate logic
 - I.2.4.h Relation systems
 - I.2.4.i Representation languages
 - I.2.4.j Representations (procedural and rule-based)

- I.2.4.k Semantic networks
- I.2.4.l Storage mechanisms
- I.2.4.m Temporal logic
- I.2.5 Programming Languages and Software
- I.2.5.a Expert and knowledge-intensive system tools and techniques
- I.2.6 Learning
- I.2.6.a Analogies
- I.2.6.b Concept learning
- I.2.6.c Connectionism and neural nets
- I.2.6.d Heuristics design
- I.2.6.e Induction
- I.2.6.f Knowledge acquisition
- I.2.6.g Machine learning
- I.2.6.h Language acquisition
- I.2.6.i Parameter learning
- I.2.7 Natural Language Processing
- I.2.7.a Discourse
- I.2.7.b Language generation
- I.2.7.c Language models
- I.2.7.d Language parsing and understanding
- I.2.7.e Language summarization
- I.2.7.f Machine translation
- I.2.7.g Speech recognition and synthesis
- I.2.7.h Text analysis
- I.2.7.i Web text analysis
- I.2.8 Problem Solving, Control Methods, and Search
- I.2.8.a Backtracking
- I.2.8.b Constraint satisfaction
- I.2.8.c Control theory
- I.2.8.d Dynamic programming
- I.2.8.e Graph and tree search strategies
- I.2.8.f Heuristic methods
- I.2.8.g Plan execution, formation, and generation
- I.2.8.h Scheduling
- I.2.9 Robotics
- I.2.9.a Autonomous vehicles
- I.2.9.b Biorobotics
- I.2.9.c Commercial robots and applications
- I.2.9.d Kinematics and dynamics

- I.2.9.e Manipulators
- I.2.9.f Nanorobots
- I.2.9.g Neuromorphic computing
- I.2.9.h Operator interfaces
- I.2.9.i Propelling mechanisms
- I.2.9.j Sensors
- I.2.9.k Workcell organization and planning
- I.2.9.l Vision
- I.2.10 Vision and Scene Understanding
 - I.2.10.a 3D/stereo scene analysis
 - I.2.10.b Architecture and control structures
 - I.2.10.c Intensity, color, photometry, and thresholding
 - I.2.10.d Modeling and recovery of physical attributes
 - I.2.10.e Motion
 - I.2.10.f Perceptual reasoning
 - I.2.10.g Representations, data structures, and transforms
 - I.2.10.h Shape
 - I.2.10.i Texture
 - I.2.10.j Video analysis
- I.2.11 Distributed Artificial Intelligence
 - I.2.11.a Coherence and coordination
 - I.2.11.b Intelligent agents
 - I.2.11.c Languages and structures
 - I.2.11.d Multiagent systems
- I.2.12 Intelligent Web Services and Semantic Web
 - I.2.12.a Intelligent Web service languages
 - I.2.12.b Internet reasoning services
 - I.2.12.c Ontology design
 - I.2.12.d Ontology languages
- I.2.13 Knowledge Management
 - I.2.13.a Knowledge acquisition
 - I.2.13.b Knowledge engineering methodologies
 - I.2.13.c Knowledge life cycles
 - I.2.13.d Knowledge maintenance
 - I.2.13.e Knowledge modeling
 - I.2.13.f Knowledge personalization and customization
 - I.2.13.g Knowledge publishing

- I.2.13.h Knowledge retrieval
- I.2.13.i Knowledge reuse
- I.2.13.j Knowledge valuation
- I.2.m Miscellaneous
 - I.2.m.a Adaptive hypermedia
 - I.2.m.b Computational neuroscience
 - I.2.m.c Evolutionary computing and genetic algorithms
 - I.2.m.d Wearable AI
- I.3 Computer Graphics
 - I.3.0 General
 - I.3.1 Hardware Architecture
 - I.3.1.a Graphics processors
 - I.3.1.b Hardcopy devices
 - I.3.1.c Input devices
 - I.3.1.d Parallel processing
 - I.3.1.e Raster display devices
 - I.3.1.f Storage devices
 - I.3.1.g Three-dimensional displays
 - I.3.1.h Vector display devices
 - I.3.2 Graphics Systems
 - I.3.2.a Distributed/network graphics
 - I.3.2.b Remote systems
 - I.3.2.c Stand-alone systems
 - I.3.3 Picture/Image Generation
 - I.3.3.a Antialiasing
 - I.3.3.b Bitmap and frame buffer operations
 - I.3.3.c Digitizing and scanning
 - I.3.3.d Display algorithms
 - I.3.3.e Image-based rendering
 - I.3.3.f Line and curve generation
 - I.3.3.g Viewing algorithms
 - I.3.4 Graphics Utilities
 - I.3.4.a Application packages
 - I.3.4.b Device drivers
 - I.3.4.c Graphics editors
 - I.3.4.d Graphics packages
 - I.3.4.e Meta files
 - I.3.4.f Paint systems
 - I.3.4.g Picture description languages
 - I.3.4.h Software support
 - I.3.4.i Virtual device interfaces

I.3.5 Computational Geometry and Object Modeling

I.3.5.a Boundary representations

I.3.5.b Constructive solid geometry

I.3.5.c Curve, surface, solid, and object representations

I.3.5.d Geometric algorithms, languages, and systems

I.3.5.e Hierarchy and geometric transformations

I.3.5.f Modeling packages

I.3.5.g Modeling from video

I.3.5.h Object hierarchies

I.3.5.i Physically based modeling

I.3.5.j Splines

I.3.6 Methodology and Techniques

I.3.6.a Device independence

I.3.6.b Ergonomics

I.3.6.c Graphics data structures and data types

I.3.6.d Interaction techniques

I.3.6.e Languages

I.3.6.f Standards

I.3.7 Three-Dimensional Graphics and Realism

I.3.7.a Animation

I.3.7.b Color, shading, shadowing, and texture

I.3.7.c Fractals

I.3.7.d Hidden line/surface removal

I.3.7.e Radiosity

I.3.7.f Raytracing

I.3.7.g Virtual reality

I.3.7.h Visible line/surface algorithms

I.3.8 Applications

I.3.m Miscellaneous

I.4 Image Processing and Computer Vision

I.4.0 General

I.4.0.a Image displays

I.4.0.b Image processing software

I.4.1 Digitization and Image Capture

I.4.1.a Camera calibration

I.4.1.b Imaging geometry

I.4.1.c Quantization

I.4.1.d Radiometry

- I.4.1.e Reflectance
- I.4.1.f Sampling
- I.4.1.g Scanning
- I.4.2 Compression (Coding)
 - I.4.2.a Approximate methods
 - I.4.2.b Exact coding
 - I.4.2.c Model-based coding
 - I.4.2.d MP-4 and MP-7
 - I.4.2.e Video coding
- I.4.3 Enhancement
 - I.4.3.a Filtering
 - I.4.3.b Geometric correction
 - I.4.3.c Grayscale manipulation
 - I.4.3.d Registration
 - I.4.3.e Sharpening and deblurring
 - I.4.3.f Smoothing
- I.4.4 Restoration
 - I.4.4.a Inverse filtering
 - I.4.4.b Kalman filtering
 - I.4.4.c Pseudoinverse restoration
 - I.4.4.d Wiener filtering
- I.4.5 Reconstruction
 - I.4.5.a Series expansion methods
 - I.4.5.b Summation methods
 - I.4.5.c Transform methods
- I.4.6 Segmentation
 - I.4.6.a Edge and feature detection
 - I.4.6.b Graph-theoretic methods
 - I.4.6.c Markov random fields
 - I.4.6.d Pixel classification
 - I.4.6.e Region growing, partitioning
 - I.4.6.f Relaxation
 - I.4.6.g Stochastic methods
- I.4.7 Feature Measurement
 - I.4.7.a Feature representation
 - I.4.7.b Invariants
 - I.4.7.c Moments
 - I.4.7.d Projections
 - I.4.7.e Size and shape
 - I.4.7.f Texture
- I.4.8 Scene Analysis
 - I.4.8.a Color

- I.4.8.b Depth cues
- I.4.8.c Image models
- I.4.8.d Motion
- I.4.8.e Object recognition
- I.4.8.f Photometry
- I.4.8.g Range data
- I.4.8.h Sensor fusion
- I.4.8.i Shading
- I.4.8.j Shape
- I.4.8.k Stereo
- I.4.8.l Surface fitting
- I.4.8.m Time-varying imagery
- I.4.8.n Tracking
- I.4.9 Applications
- I.4.10 Image Representation
 - I.4.10.a Hierarchical
 - I.4.10.b Morphological
 - I.4.10.c Multidimensional
 - I.4.10.d Statistical
 - I.4.10.e Volumetric
- I.4.m Miscellaneous
- I.5 Pattern Recognition
 - I.5.0 General
 - I.5.1 Models
 - I.5.1.a Deterministic
 - I.5.1.b Fuzzy set
 - I.5.1.c Geometric
 - I.5.1.d Neural nets
 - I.5.1.e Statistical
 - I.5.1.f Structural
 - I.5.1.g Syntactic
 - I.5.2 Design Methodology
 - I.5.2.a Classifier design and evaluation
 - I.5.2.b Feature evaluation and selection
 - I.5.2.c Pattern analysis
 - I.5.3 Clustering
 - I.5.3.a Algorithms
 - I.5.3.b Similarity measures
 - I.5.4 Applications
 - I.5.4.a Arts
 - I.5.4.b Computer vision
 - I.5.4.c Computational models of vision

- I.5.4.d Face and gesture recognition
- I.5.4.e Government
- I.5.4.f Handwriting analysis
- I.5.4.g Industry
- I.5.4.h Medicine
- I.5.4.i Military
- I.5.4.j Remote sensing
- I.5.4.k Robotics
- I.5.4.l Sciences
- I.5.4.m Signal processing
- I.5.4.n Text processing
- I.5.4.o Waveform analysis
- I.5.5 Implementation
 - I.5.5.a Interactive systems
 - I.5.5.b Real-time systems
 - I.5.5.c Special architectures
- I.5.m Miscellaneous
- I.6 Simulation, Modeling, and Visualization
 - I.6.0 General
 - I.6.1 Simulation Theory
 - I.6.1.a Model classification
 - I.6.1.b Systems theory
 - I.6.1.c Types of simulation
 - I.6.2 Simulation Languages
 - I.6.3 Applications
 - I.6.4 Model Validation and Analysis
 - I.6.5 Model Development
 - I.6.5.a Modeling methodologies
 - I.6.6 Simulation Output Analysis
 - I.6.7 Simulation Support Systems
 - I.6.7.a Environments
 - I.6.8 Types of Simulation
 - I.6.8.a Animation
 - I.6.8.b Combined
 - I.6.8.c Continuous
 - I.6.8.d Discrete event
 - I.6.8.e Distributed
 - I.6.8.f Gaming
 - I.6.8.g Monte Carlo
 - I.6.8.h Parallel
 - I.6.8.i Visual
 - I.6.9 Visualization

- I.6.9.a Applications
- I.6.9.b Flow visualization
- I.6.9.c Information visualization
- I.6.9.d Multivariate visualization
- I.6.9.e Visual programming and program visualization
- I.6.9.f Visualization systems and software
- I.6.9.g Visualization techniques and methodologies
- I.6.9.h Volume visualization
- I.6.m Miscellaneous
- I.7 Document and Text Processing
 - I.7.0 General
 - I.7.1 Document and Text Editing
 - I.7.1.a Document management
 - I.7.1.b Languages
 - I.7.1.c Spelling
 - I.7.1.d Version control
 - I.7.2 Document Preparation
 - I.7.2.a Desktop publishing
 - I.7.2.b Format and notation
 - I.7.2.c Hypertext/hypermedia
 - I.7.2.d Index generation
 - I.7.2.e Languages and systems
 - I.7.2.f Markup languages
 - I.7.2.g Multi/mixed media
 - I.7.2.h Photocomposition/typesetting
 - I.7.2.i Scripting languages
 - I.7.2.j Standards
 - I.7.3 Index Generation
 - I.7.4 Electronic Publishing
 - I.7.5 Document Capture
 - I.7.5.a Document analysis
 - I.7.5.b Document indexing
 - I.7.5.c Graphics recognition and interpretation
 - I.7.5.d Optical character recognition
 - I.7.5.e Scanning
 - I.7.m Miscellaneous
 - I.m Miscellaneous
- J Computer Applications
 - J.0 General
 - J.1 Administrative Data Processing

- J.1.a Business
- J.1.b Education
- J.1.c Financial
- J.1.d Government
- J.1.e Law
- J.1.f Manufacturing
- J.1.g Marketing
- J.1.h Military
- J.2 Physical Sciences and Engineering
 - J.2.a Aerospace
 - J.2.b Archaeology
 - J.2.c Astronomy
 - J.2.d Chemistry
 - J.2.e Earth and atmospheric sciences
 - J.2.f Electronics
 - J.2.g Engineering
 - J.2.h Mathematics and statistics
 - J.2.i Physics
- J.3 Life and Medical Sciences
 - J.3.a Biology and genetics
 - J.3.b Health
 - J.3.c Medical information systems
- J.4 Social and Behavioral Sciences
 - J.4.a Economics
 - J.4.b Psychology
 - J.4.c Sociology
- J.5 Arts and Humanities
 - J.5.a Architecture
 - J.5.b Arts, fine and performing
 - J.5.c Fine arts
 - J.5.d Language translation
 - J.5.e Linguistics
 - J.5.f Literature
 - J.5.g Music
 - J.5.h Performing arts
- J.6 Computer-Aided Engineering
 - J.6.a Computer-aided design
 - J.6.b Computer-aided manufacturing
- J.7 Computers in Other Systems
 - J.7.a Command and control
 - J.7.b Consumer products
 - J.7.c Industrial control

- J.7.d Military
- J.7.e Process control
- J.7.f Publishing
- J.7.g Real time
- J.8 Internet Applications
 - J.8.a Client/server and multitier systems
 - J.8.b Databases
 - J.8.c Database connectivity
 - J.8.d Distributed file systems
 - J.8.e Electronic commerce
 - J.8.f Engineering design
 - J.8.g Games
 - J.8.h Health care
 - J.8.i Intranet/extranet/VPNs
 - J.8.j Libraries/information repositories/publishing
 - J.8.k Manufacturing
 - J.8.l Middleware/business logic
 - J.8.m Network repositories/data mining/backup
 - J.8.n Software engineering
 - J.8.o Traffic analysis
 - J.8.p Transaction software
 - J.8.q Web browsers
 - J.8.r Web servers
 - J.8.s Web site management/development tools
- J.9 Mobile Applications
 - J.9.a Location-dependent and sensitive
 - J.9.b Nomadic computing
 - J.9.c Multimedia applications and multimedia signal processing
 - J.9.d Pervasive computing
 - J.9.e Wearable computers and body area networks
 - J.9.f Wireless sensor networks
- J.m Miscellaneous
- K Computing Milieux
 - K.0 General
 - K.1 The Computer Industry
 - K.1.a Markets
 - K.1.b Standards
 - K.1.c Statistics

- K.1.d Suppliers
- K.2 History of Computing
 - K.2.a Hardware
 - K.2.b People
 - K.2.c Software
 - K.2.d Systems
 - K.2.e Theory
- K.3 Computers and Education
 - K.3.0 General
 - K.3.1 Computer Uses in Education
 - K.3.1.a Collaborative learning
 - K.3.1.b Computer-assisted instruction
 - K.3.1.c Computer-managed instruction
 - K.3.1.d Distance learning
 - K.3.2 Computer and Information Science Education
 - K.3.2.a Accreditation
 - K.3.2.b Computer science education
 - K.3.2.c Curriculum
 - K.3.2.d Information systems education
 - K.3.2.e Literacy
 - K.3.2.f Self-assessment
 - K.3.m Miscellaneous
 - K.3.m.a Accreditation
 - K.3.m.b Computer literacy
- K.4 Computers and Society
 - K.4.0 General
 - K.4.1 Public Policy Issues
 - K.4.1.a Abuse and crime involving computers
 - K.4.1.b Computer-related health issues
 - K.4.1.c Ethics
 - K.4.1.d Human safety
 - K.4.1.e Intellectual property rights
 - K.4.1.f Privacy
 - K.4.1.g Regulation
 - K.4.1.h Transborder data flow
 - K.4.1.i Use/abuse of power
 - K.4.2 Social Issues
 - K.4.2.a Abuse and crime involving computers
 - K.4.2.b Assistive technologies for persons with disabilities
 - K.4.2.c Employment

- K.4.2.d Handicapped persons/special needs
- K.4.3 Organizational Impacts
 - K.4.3.a Automation
 - K.4.3.b Computer-supported collaborative work

- K.4.3.c Deployment, usage experience
 - K.4.3.d Employment
 - K.4.3.e Reengineering
 - K.4.3.f Scalability, maintainability
- K.4.4 Electronic Commerce
 - K.4.4.a Cybercash, digital cash
 - K.4.4.b Distributed commercial transactions
 - K.4.4.c Electronic data interchange
 - K.4.4.d Intellectual property
 - K.4.4.e Payment schemes
 - K.4.4.f Security
 - K.4.4.g Internet security policies
 - K.4.4.h Mobile code security
 - K.4.4.i Economic and other policies

- K.4.m Miscellaneous

- K.5 Legal Aspects of Computing

- K.5.0 General

- K.5.1 Hardware/Software Protection

- K.5.1.a Copyrights

- K.5.1.b Licensing

- K.5.1.c Patents

- K.5.1.d Proprietary rights

- K.5.1.e Trade secrets

- K.5.2 Governmental Issues

- K.5.2.a Censorship

- K.5.2.b Regulation

- K.5.2.c Taxation

- K.5.m Miscellaneous

- K.5.m.a Contracts

- K.5.m.b Hardware patents

- K.6 Management of Computing and Information Systems

- K.6.0 General

- K.6.0.a Economics

- K.6.0.b Information resource management

- K.6.1 Project and People Management

- K.6.1.a Life cycle

- K.6.1.b Management techniques
- K.6.1.c Staffing
- K.6.1.d Strategic information systems planning
- K.6.1.e Systems analysis and design
- K.6.1.f Systems development
- K.6.1.g Training
- K.6.2 Installation Management
 - K.6.2.a Benchmarks
 - K.6.2.b Computer selection
 - K.6.2.c Computing equipment management
 - K.6.2.d Performance and usage measurement
 - K.6.2.e Pricing and resource allocation
- K.6.3 Software Management
 - K.6.3.a Software development
 - K.6.3.b Software maintenance
 - K.6.3.c Software process
 - K.6.3.d Software selection
- K.6.4 System Management
 - K.6.4.a Centralization/decentralization
 - K.6.4.b Management audit
 - K.6.4.c Quality assurance
- K.6.5 Security and Protection
 - K.6.5.a Authentication
 - K.6.5.b Insurance
 - K.6.5.c Invasive software (viruses, worms, Trojan horses)
 - K.6.5.d Physical security
 - K.6.5.e Unauthorized access (hacking, phreaking)
- K.6.m Miscellaneous
 - K.6.m.a Insurance
 - K.6.m.b Security
- K.7 The Computing Profession
 - K.7.0 General
 - K.7.0.a Career Management
 - K.7.1 Occupations
 - K.7.2 Organizations
 - K.7.3 Testing, Certification, and Licensing
 - K.7.4 Professional Ethics
 - K.7.4.a Codes of ethics
 - K.7.4.b Codes of good practice
 - K.7.4.c Ethical dilemmas

- K.7.m Miscellaneous
 - K.7.m.a Codes of good practice
 - K.7.m.b Ethics
- K.8 Personal Computing
 - K.8.0 General
 - K.8.0.a Games
 - K.8.1 Application Packages
 - K.8.1.a Data communications
 - K.8.1.b Database processing
 - K.8.1.c Freeware/shareware
 - K.8.1.d Graphics
 - K.8.1.e Spreadsheets
 - K.8.1.f Word processing
 - K.8.2 Hardware
 - K.8.3 Management/Maintenance
- K.8.m Miscellaneous
- K.m Miscellaneous
 - K.m.a Business
 - K.m.b Education
 - K.m.c Financial
 - K.m.d Healthcare
 - K.m.e Industrial
 - K.m.f IT Applications
 - K.m.g Legal
 - K.m.h Library
 - K.m.i Military
 - K.m.j Publishing
 - K.m.k Sports
- L. Haptics
 - L.0 General
 - L.1 Human Haptics
 - L.1.0 Touch-based properties and capabilities of the human user
 - L.1.0.a Attention
 - L.1.0.b Biomechanics
 - L.1.0.c Cognition
 - L.1.0.d Human factors and ergonomics
 - L.1.0.e Human performance
 - L.1.0.f Neuroscience
 - L.1.0.g Perception and psychophysics
 - L.2 Haptics Technology

L.2.0 Hardware and software that enable touch-based interactions with real, remote, and virtual environments

L.2.0.a Kinesthetic devices

L.2.0.b Tactile devices

L.2.0.c Tactile display

L.2.0.d Haptic display

L.2.0.f Sensors

L.2.0.g Haptic rendering

L.2.0.h Collision detection

L.2.0.i Force rendering

L.2.0.j Texture rendering

L.2.0.k Graphic rendering

L.2.0.l Virtual reality

L.2.0.m Virtual environment modeling

L.2.0.n Dynamic systems and control

L.2.0.o Force feedback

L.2.0.p Transparency

L.2.0.q Real time control

L.2.0.r Telepresence

L.2.0.s Telemanipulation

L.2.0.t Measurement-based synthesis/modeling

L.2.0.u Multimodal systems

L.2.0.w System design and analysis

L.3 Haptics Applications

L.3.0 Integrating touch-based interactions into various domains Assistive technology

L.3.0.a Art

L.3.0.b Automotive

L.3.0.c Design

L.3.0.d Education

L.3.0.e Entertainment

L.3.0.f Human-computer interaction

L.3.0.g Manufacturing/assembly

L.3.0.h Medical simulation

L.3.0.i Micro/Nano technology

L.3.0.j. Molecular biology

L.3.0.k Prosthetics

L.3.0.l Rehabilitation

L.3.0.m Scientific visualization

L.3.0.n Space

L.3.0.p Surgical robotics

L.3.0.q Neuroscience

- M Services Computing
 - M.0 General
 - M.1 Principles of Services
 - M.1.0 General
 - M.1.0.a Services Systems
 - M.1.0.b Services Models
 - M.1.0.c Services Technologies
 - M.1.0.d Services Architectures
 - M.1.0.e Optimization of Services Systems
 - M.2 Services Lifecycle
 - M.2.0 General
 - M.2.0.a Consulting and Strategic Planning
 - M.2.0.b Services Engagement
 - M.2.0.c Services Delivery
 - M.2.0.d Services Operation
 - M.2.0.e Services Billing
 - M.2.0.f Services Management
 - M.2.1 Key Factors in Services Lifecycle
 - M.2.1.a Data/Information
 - M.2.1.b Processes
 - M.2.1.c People
 - M.2.1.d Resources
 - M.2.1.e Finance Factors
 - M.2.1.f Knowledge and Skills
 - M.2.1.g Innovation and Technology
 - M.2.2 Service-Oriented Business Models
 - M.2.2.a Services Modernization
 - M.2.2.b Software As Services
 - M.2.2.c Services As Software
 - M.3 Web Services
 - M.3.0 General
 - M.3.0.a Web Services Modeling
 - M.3.0.b Web Services Communication Protocols
 - M.3.0.c Web Services Binding
 - M.3.0.d Web Services Publishing
 - M.3.0.e Stateful Web Services
 - M.3.0.f Web Services Interoperability
 - M.3.1 Composite Services
 - M.3.1.a Composite Web Services
 - M.3.1.b Representation of Composite Services
 - M.3.1.c Three-Dimensional Modeling
 - M.3.2 Web Services Publishing
 - M.3.2.a Public Services Registry
 - M.3.2.b Private Services Registry
 - M.3.2.c Distributed Services Registry
 - M.3.3 Web Services Discovery
 - M.3.3.a Search Discovery Language
 - M.3.3.b Services Discovery Engine
 - M.3.3.c Services Discovery Process and Methodology
 - M.3.3.d Services Discovery Architecture
 - M.3.3.e Federated Services Discovery
 - M.4 Service-Oriented Architecture

- M.4.0 General
 - M.4.0.a Operational Model
 - M.4.0.b Realization
- M.4.1 Services Innovation
 - M.4.1.a Simple Services Invocation
 - M.4.1.b Metadata of Services Interfaces
 - M.4.1.c Metadata Publishing
 - M.4.1.d Advanced Services Invocation Framework
- M.4.2 Bridging Business and IT Architecture
 - M.4.2.a Enterprise Level Transformation
 - M.4.2.b Process Level Transformation
 - M.4.2.c Programming Level Transformation
- M.4.3 Solution Lifecycle
 - M.4.3.a Solution Modeling
 - M.4.3.b Solution Development
 - M.4.3.c Solution Deployment
 - M.4.3.d Solution Publishing
 - M.4.3.e Solution Discovery
 - M.4.3.f Solution Invocation
 - M.4.3.g Solution Composition
 - M.4.3.h Collaborations in Solution
 - M.4.3.i Solution Monitoring
 - M.4.3.j Solution Management
- M.4.4 Solution Reference Architectures
 - M.4.4.a Architecture Overview Diagram
 - M.4.4.b User Interaction and Presentation
 - M.4.4.c Processes
 - M.4.4.d Services
 - M.4.4.e Services Components
 - M.4.4.f Operational Systems
 - M.4.4.g Integration
 - M.4.4.h Quality of Services
 - M.4.4.i Data Architecture
 - M.4.4.j Governance
- M.5 Services Relationships
 - M.5.0 General
 - M.5.0.a Relationships in Services Registries
 - M.5.0.b Relationship Specification Languages
 - M.5.1 Web Services Relationship Language
 - M.5.1.a Relationship Modeling Schema
 - M.5.1.b Layered Services Relationship Modeling
 - M.5.1.c Extensions
 - M.5.2 Service-Oriented Relationship Modeling
 - M.5.2.a Business Services Relationship
 - M.5.2.b Modeling at Business Entity Level
 - M.5.2.c Modeling at Business Service Level
 - M.5.2.d Relationship Enriched Services Registry
- M.6 Services Composition
 - M.6.0 General
 - M.6.0.a Aspects of Business Requirements
 - M.6.0.b Business Requirements Modeling
 - M.6.0.c Requirements Driven Services Discovery

- M.6.0.d Formalization of Services Composition
- M.6.1 Services Integration Framework
 - M.6.1.a Services Integration Procedure
 - M.6.1.b Optimization of Services Composition
- M.6.2 Services Value Chain Collaboration
 - M.6.2.a Inter-Enterprise Collaboration
 - M.6.2.b Intra-Enterprise Collaboration
 - M.6.2.c Extended Business Collaboration Model
 - M.6.2.d Annotated Business HyperChain
 - M.6.2.e Web Services Collaboration Resources
 - M.6.2.f Collaboration Message Primitives
 - M.6.2.g Collaboration Construct
 - M.6.2.h Collaborative Exchange Protocol
- M.7 Business Process Management & Integration
 - M.7.0 General
 - M.7.0.a Business Process Modeling
 - M.7.0.b Business Process Management
 - M.7.1 Service-Oriented Business Process Management
 - M.7.1.a Top-Down Process Management
 - M.7.1.b Bottom-up Process Management
 - M.7.1.c Business Process Reengineering
 - M.7.1.d Process Re-engineering Methodology
 - M.7.2 Flexible Business Process Integration
 - M.7.2.a Lifecycle of an Integration Activity
 - M.7.2.b Integration Activity Modeling
 - M.7.2.c Business Process Monitoring
- M.8 Business Grid
 - M.8.0 General
 - M.8.0.a Service-Oriented Grid Computing
 - M.8.0.b Business Grid Solution Framework
 - M.8.1 Logical Grid Infrastructure
 - M.8.1.a Packaged Application Grid
 - M.8.1.b Business Grid Middleware
 - M.8.1.c Business Process Grid
 - M.8.2 Business Grid Solution Development
 - M.8.2.a Business Grid Service Development
 - M.8.2.b Business Grid Service Invocation
- M.9 Enterprise Modeling and Management
 - M.9.0 General
 - M.9.0.a Dynamics of Services Ecosystem
 - M.9.0.b Requirements for Enterprise Modeling
 - M.9.1 Methodologies for Enterprise Modeling
 - M.9.1.a Balanced Scorecard and Strategy Map
 - M.9.1.b Component Business Modeling Circle
 - M.9.1.c Enterprise Architecture
 - M.9.1.d Enterprise Transformation
 - M.9.2 Enterprise Performance Management
 - M.9.2.a Enterprise Project Management
 - M.9.2.b Enterprise Performance Management
 - M.9.2.c Service-Oriented Enterprise Management
 - M.9.2.d Enterprise Portfolio Management
- M.10 Service-Oriented Consulting Methodology

- M.10.0 General
 - M.10.0.a Consulting Method for Strategic Change
 - M.10.0.b Consulting Method for IT Strategic Plan
- M.10.1 Service-Oriented Business Consulting
 - M.10.1.a Gap Analysis
 - M.10.1.b Initiatives Identification
 - M.10.1.c Value Chain Analysis
 - M.10.1.d Business Case Analysis
 - M.10.1.e Portfolio Analysis
 - M.10.1.f Transition Planning
 - M.10.1.g Project Management and Collaboration
 - M.10.1.h IT Service Management
- M.11 Services Delivery Platform and Methodology
 - M.11.0 General
 - M.11.0.a Services Delivery Mechanisms
 - M.11.0.b Services Engineering
 - M.11.1 Service-Oriented Services Delivery Platform
 - M.11.1.a Services Delivery Platform
 - M.11.1.b Collaborative Services Delivery Platform
 - M.11.1.c Common Services
 - M.11.2 Services Delivery Methodology
 - M.11.2.a Services Delivery Readiness Phase
 - M.11.2.b Services Delivery Creation Phase
 - M.11.2.c Services Delivery Operation
 - M.11.3 Software as Services
 - M.11.3.a Web 2.0 and Web X.o
 - M.11.3.b Service Mash-up
 - M.11.3.c New Business Models
 - M.11.4 Services as Software
 - M.11.4.a Asset-based Services Model
 - M.11.4.b Services Software
- M.12 Application Services and Standards
 - M.12.0 General
 - M.12.0.a Case Studies in Industry
 - M.12.0.b Case Studies in Scientific Applications
 - M.12.0.c Case Studies in Government
 - M.12.1 Solution-Level Quality of Service
 - M.12.1.a Context-Aware QoS Model
 - M.12.1.b Representation of QoS Model
 - M.12.1.c QoS Data Management
 - M.12.1.d Business Relationship Model
 - M.12.1.e Solution-Level QoS Framework
 - M.12.2 Data Architecture Framework
 - M.12.2.a Constructs in Data Architecture
 - M.12.2.b Relationships Between Constructs
 - M.12.3 QoS Management Modeling
 - M.12.3.a Modeling of Resources
 - M.12.3.b Modeling the QoS Assurance Process
 - M.12.4 Web Services Standard Stack
 - M.12.4.a Transport
 - M.12.4.b Messaging
 - M.12.4.c Description/Publishing/Discovery

- M.12.4.d Quality of Service
- M.12.4.e Service Composition
- M.12.5 Industry-Specific Standards
 - M.12.5.a Service-Oriented Solution Reference Architecture
 - M.12.5.b New Standards
 - M.12.5.c Case Studies
- N. Learning Technologies
 - N.0 General
 - N.1 Learning environments
 - N.1.a Educational games
 - N.1.b Learning via discovery
 - N.1.c Fieldwork learning
 - N.1.d Virtual labs
 - N.1.e Educational simulations
 - N.1.f Nomadic learning environments
 - N.1.g Virtual and augmented reality
 - N.2 E-learning tools
 - N.2.a Web lectures and notes
 - N.2.b Learning management systems
 - N.2.c Lecture notes
 - N.2.d Discussion forums
 - N.2.e Instructor interfaces
 - N.2.f Homework support systems
 - N.2.g Automatic assessment tools
 - N.2.h Self-assessment technologies
 - N.3 Social Technologies
 - N.3.a Social learning techniques
 - N.3.b Collaborative learning tools
 - N.3.c Social networking
 - N.3.d Knowledge sharing
 - N.3.e Peer tutoring
 - N.3.f Peer reviewing
 - N.3.g User generated learning content
 - N.4 Adaptive and intelligent educational systems
 - N.4.a Intelligent tutoring systems
 - N.4.b Adaptive Hypermedia
 - N.4.c Personalized E-learning
 - N.5 Standards and interoperability
 - N.5.a E-learning standards
 - N.5.b Learning objects
 - N.5.c Ontologies
 - N.5.d Web services
 - N.5.e Authoring tools
 - N.6 Devices for learning
 - N.6.a Mobile and personal devices
 - N.6.b Tablet PCs
 - N.6.c Classroom feedback systems
 - N.6.d Multitouch devices
 - N.6.e Large screen interaction
- O Affective Computing
 - O.0 General
 - O.1 Affect sensing and analysis

- O.1.1 Nonverbal signals
 - O.1.1.a Facial expression
 - O.1.1.b Gesture
 - O.1.1.c Posture
- O.1.2 Natural language
 - O.1.2.a Sentiment analysis
 - O.1.2.b Speech analysis
 - O.1.2.c Paralanguage analysis
- O.1.3 Physiological Measures
 - O.1.3.a Central measures
 - O.1.3.b Peripheral measures
- O.1.4 Multi-modal recognition
- O.1.5 Recognition of group emotion
- O.2 Modeling human emotion
 - O.2.1 Cognitive models
 - O.2.1.a Appraisal processes
 - O.2.1.b Mood or core affect
 - O.2.1.c Consequences for decision-making
 - O.2.1.d Regulation and coping
 - O.2.1.e Consequences for learning
 - O.2.1.f Affective priming
 - O.2.2 Neural models
 - O.2.3 Perceptual models
 - O.2.3.a perceptual biases
 - O.2.3.b Emotion contagion
 - O.2.4 Action selection
 - O.2.5 Emotion theory
 - O.2.6 Individual and cultural differences
 - O.2.7 Diagnosis or assessment
 - O.2.8 Evaluation studies
- O.3 Synthesis of affective behavior
 - O.3.1 Standards and markup languages
 - O.3.2 Nonverbal synthesis
 - O.3.2.a Facial expression
 - O.3.2.b Gesture
 - O.3.2.c Posture
 - O.3.2.d Physiological signals
 - O.3.3 Language synthesis
 - O.3.3.a Emotional text generation
 - O.3.3.b Emotional speech synthesis
 - O.3.3.c Paralanguage synthesis
 - O.3.4 Multimodal synthesis
- O.4 Affective issues in user interaction
 - O.4.1 Emotion in human-computer interaction
 - O.4.2 Emotion in human-robotic interaction
 - O.4.3 Social effects of synthetic emotion
 - O.4.4 Adaptation to user state
 - O.4.5 Influencing human emotional state
 - O.4.6 Emotional rapport, empathy and resonance
- O.5 Affective issues in enhancing machine/robotic intelligence
 - O.5.1 Comparison to rational methods
 - O.5.2 Function in intelligent systems

- O.5.3 Function in multi-agent systems
- O.5.4 Function in robotic systems
- O.6 Emotional corpora
 - O.6.1 Methods of data collection
 - O.6.2 Methods for emotion elicitation
 - O.6.3 Tools and methods of annotation
- O.7 Technology & devices for affective computing
- O.8 Affective computing applications
 - O.8.1 Education
 - O.8.2 Health care
 - O.8.3 Entertainment
 - O.8.4 Interactive narrative
 - O.8.5 Customer service
 - O.8.6 Design
 - O.8.7 Vehicle operation
 - O.8.8 Social agents/robotics
 - O.8.9 Affective ambient intelligence
 - O.8.10 Customer experience measurement
 - O.8.11 Multimedia retrieval
 - O.8.12 Surveillance systems
 - O.8.13 Biometrics
 - O.8.14 Music retrieval and generation
 - O.8.15 Social science methods or tools
- O.9 Ethical/Societal Implications
 - O.9.1 Engineering ethics
 - O.9.2 Health implications
 - O.9.3 Moral implications
 - O.9.4 Legal implications
 - O.9.5 Public policy