

Computing Classification System, 2012 Revision

**Association for Computing Machinery**

30 March 2012

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Signal processing systems

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III-V compounds

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Quantum error correction and fault tolerance

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Network domains

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Human and societal aspects of security and privacy

Economics of security and privacy

Social aspects of security and privacy

Privacy protections

Usability in security and privacy

## Human-centered computing

Human computer interaction (HCI)

HCI design and evaluation methods

User models

User studies

Usability testing

Heuristic evaluations

Walkthrough evaluations

Laboratory experiments

Field studies

Interaction paradigms

Hypertext / hypermedia

Mixed / augmented reality

Command line interfaces

Graphical user interfaces

Virtual reality

Web-based interaction

Natural language interfaces

Collaborative interaction

Interaction devices

Graphics input devices

Displays and imagers

Sound-based input / output

Keyboards

Pointing devices

Touch screens

Haptic devices

HCI theory, concepts and models

Interaction techniques

Auditory feedback

Text input

Pointing

Gestural input

Interactive systems and tools

User interface management systems

User interface programming

User interface toolkits

Empirical studies in HCI

Interaction design

Interaction design process and methods

User interface design

User centered design

Activity centered design

Scenario-based design

Participatory design

Contextual design

Interface design prototyping

Interaction design theory, concepts and paradigms

Empirical studies in interaction design

Systems and tools for interaction design

Wireframes

Collaborative and social computing

Collaborative and social computing theory, concepts and paradigms

Social content sharing

Collaborative content creation

Collaborative filtering

Social recommendation

Social networks

Social tagging

Computer supported cooperative work

Social engineering (social sciences)

Social navigation

Social media

Collaborative and social computing design and evaluation methods

Social network analysis

Ethnographic studies

Collaborative and social computing systems and tools

Blogs

Wikis

Reputation systems

Open source software

Social networking sites

Social tagging systems

Synchronous editors

Asynchronous editors

Empirical studies in collaborative and social computing

Collaborative and social computing devices

Ubiquitous and mobile computing

Ubiquitous and mobile computing theory, concepts and paradigms

Ubiquitous computing

Mobile computing

Ambient intelligence

Ubiquitous and mobile computing systems and tools

Ubiquitous and mobile devices

Smartphones

Interactive whiteboards

Mobile phones

Mobile devices

Portable media players

Personal digital assistants

Handheld game consoles

E-book readers

Tablet computers

Ubiquitous and mobile computing design and evaluation methods

Empirical studies in ubiquitous and mobile computing

Visualization

Visualization techniques

Treemaps

Hyperbolic trees

Heat maps

Graph drawings

Dendrograms

Cladograms

Visualization application domains

Scientific visualization

Visual analytics

Geographic visualization

Information visualization

Visualization systems and tools

Visualization toolkits

Visualization theory, concepts and paradigms

Empirical studies in visualization

Visualization design and evaluation methods

Accessibility

Accessibility theory, concepts and paradigms

Empirical studies in accessibility

Accessibility design and evaluation methods

Accessibility technologies

Accessibility systems and tools

## Computing methodologies

Symbolic and algebraic manipulation

Symbolic and algebraic algorithms

Combinatorial algorithms

Algebraic algorithms

Nonalgebraic algorithms

Symbolic calculus algorithms

Exact arithmetic algorithms

Hybrid symbolic-numeric methods

Discrete calculus algorithms

Number theory algorithms

Equation and inequality solving algorithms

Linear algebra algorithms

Theorem proving algorithms

Boolean algebra algorithms

Optimization algorithms

Computer algebra systems

Special-purpose algebraic systems

Representation of mathematical objects

Representation of exact numbers

Representation of mathematical functions

Representation of Boolean functions

Representation of polynomials

Parallel computing methodologies

Parallel algorithms

MapReduce algorithms

Self-organization

Shared memory algorithms

Vector / streaming algorithms

Massively parallel algorithms

Parallel programming languages

Artificial intelligence

Natural language processing

Information extraction

Machine translation

Discourse, dialogue and pragmatics

Natural language generation

Speech recognition

Lexical semantics

Phonology / morphology

Language resources

Knowledge representation and reasoning

Description logics

Semantic networks

Nonmonotonic, default reasoning and belief revision

Probabilistic reasoning

Vagueness and fuzzy logic

Causal reasoning and diagnostics

Temporal reasoning

Cognitive robotics

Ontology engineering

Logic programming and answer set programming

Spatial and physical reasoning

Reasoning about belief and knowledge

Planning and scheduling

Planning for deterministic actions

Planning under uncertainty

Multi-agent planning

Planning with abstraction and generalization

Robotic planning

Search methodologies

Heuristic function construction

Discrete space search

Continuous space search

Randomized search

Game tree search

Abstraction and micro-operators

Search with partial observations

Control methods

Robotic planning

Computational control theory

Motion path planning

Philosophical/theoretical foundations of artificial intelligence

Cognitive science

Theory of mind

Distributed artificial intelligence

Multi-agent systems

Intelligent agents

Mobile agents

Cooperation and coordination

Computer vision

Computer vision tasks

Biometrics

Scene understanding

Activity recognition and understanding

Video summarization

Visual content-based indexing and retrieval

Visual inspection

Vision for robotics

Scene anomaly detection

Image and video acquisition

Camera calibration

Epipolar geometry

Computational photography

Hyperspectral imaging

Motion capture

3D imaging

Active vision

Computer vision representations

Image representations

Shape representations

Appearance and texture representations

Hierarchical representations

Computer vision problems

Interest point and salient region detections

Image segmentation

Video segmentation

Shape inference

Object detection

Object recognition

Object identification

Tracking

Reconstruction

Matching

Machine learning

Learning paradigms

Supervised learning

Ranking

Learning to rank

Supervised learning by classification

Supervised learning by regression

Structured outputs

Cost-sensitive learning

Unsupervised learning

Cluster analysis

Anomaly detection

Mixture modeling

Topic modeling

Source separation

Motif discovery

Dimensionality reduction and manifold learning

Reinforcement learning

Sequential decision making

Inverse reinforcement learning

Apprenticeship learning

Multi-agent reinforcement learning

Adversarial learning

Multi-task learning

Transfer learning

Lifelong machine learning

Learning under covariate shift

Learning settings

Batch learning

Online learning settings

Learning from demonstrations

Learning from critiques

Learning from implicit feedback

Active learning settings

Semi-supervised learning settings

Machine learning approaches

Classification and regression trees

Kernel methods

Support vector machines

Gaussian processes

Neural networks

Logical and relational learning

Inductive logic learning

Statistical relational learning

Learning in probabilistic graphical models

Maximum likelihood modeling

Maximum entropy modeling

Maximum a posteriori modeling

Mixture models

Latent variable models

Bayesian network models

Learning linear models

Perceptron algorithm

Factorization methods

Non-negative matrix factorization

Factor analysis

Principal component analysis

Canonical correlation analysis

Latent Dirichlet allocation

Rule learning

Instance-based learning

Markov decision processes

Partially-observable Markov decision processes

Stochastic games

Learning latent representations

Deep belief networks

Machine learning algorithms

Dynamic programming for Markov decision processes

Value iteration

Q-learning

Policy iteration

Temporal difference learning

Approximate dynamic programming methods

Ensemble methods

Boosting

Bagging

Spectral methods

Feature selection

Regularization

Cross-validation

Modeling and simulation

Model development and analysis

Modeling methodologies

Model verification and validation

Uncertainty quantification

Simulation theory

Systems theory

Network science

Simulation types and techniques

Uncertainty quantification

Quantum mechanic simulation

Molecular simulation

Rare-event simulation

Discrete-event simulation

Agent / discrete models

Distributed simulation

Continuous simulation

Continuous models

Real-time simulation

Interactive simulation

Multiscale systems

Massively parallel and high-performance simulations

Data assimilation

Scientific visualization

Visual analytics

Simulation by animation

Simulation support systems

Simulation environments

Simulation languages

Simulation tools

Simulation evaluation

Computer graphics

Animation

Motion capture

Procedural animation

Physical simulation

Motion processing

Collision detection

Rendering

Rasterization

Ray tracing

Non-photorealistic rendering

Reflectance modeling

Visibility

Image manipulation

Computational photography

Image processing

Texturing

Image-based rendering

Antialiasing

Graphics systems and interfaces

Graphics processors

Graphics input devices

Mixed / augmented reality

Perception

Graphics file formats

Virtual reality

Image compression

Shape modeling

Mesh models

Mesh geometry models

Parametric curve and surface models

Point-based models

Volumetric models

Shape analysis

Distributed computing methodologies

Distributed algorithms

MapReduce algorithms

Self-organization

Distributed programming languages

Concurrent computing methodologies

Concurrent programming languages

Concurrent algorithms

## Applied computing

Electronic commerce

Digital cash

E-commerce infrastructure

Electronic data interchange

Electronic funds transfer

Online shopping

Online banking

Secure online transactions

Online auctions

Enterprise computing

Enterprise information systems

Intranets

Extranets

Enterprise resource planning

Enterprise applications

Data centers

Business process management

Business process modeling

Business process management systems

Business process monitoring

Cross-organizational business processes

Business intelligence

Enterprise architectures

Enterprise architecture management

Enterprise architecture frameworks

Enterprise architecture modeling

Service-oriented architectures

Event-driven architectures

Business rules

Enterprise modeling

Enterprise ontologies, taxonomies and vocabularies

Enterprise data management

Reference models

Business-IT alignment

IT architectures

IT governance

Enterprise computing infrastructures

Enterprise interoperability

Enterprise application integration

Information integration and interoperability

Physical sciences and engineering

Aerospace

Avionics

Archaeology

Astronomy

Chemistry

Earth and atmospheric sciences

Environmental sciences

Engineering

Computer-aided design

Physics

Mathematics and statistics

Electronics

Avionics

Telecommunications

Internet telephony

Life and medical sciences

Computational biology

Molecular sequence analysis

Recognition of genes and regulatory elements

Molecular evolution

Computational transcriptomics

Biological networks

Sequencing and genotyping technologies

Imaging

Computational proteomics

Molecular structural biology

Computational genomics

Genomics

Computational genomics

Systems biology

Consumer health

Health care information systems

Health informatics

Bioinformatics

Metabolomics / metabonomics

Genetics

Population genetics

Proteomics

Computational proteomics

Transcriptomics

Law, social and behavioral sciences

Anthropology

Ethnography

Law

Psychology

Economics

Sociology

Computer forensics

Surveillance mechanisms

Investigation techniques

Evidence collection, storage and analysis

Network forensics

System forensics

Data recovery

Arts and humanities

Fine arts

Performing arts

Architecture (buildings)

Computer-aided design

Language translation

Media arts

Sound and music computing

Computers in other domains

Digital libraries and archives

Publishing

Military

Cyberwarfare

Cartography

Agriculture

Computing in government

Voting / election technologies

E-government

Personal computers and PC applications

Word processors

Spreadsheets

Computer games

Microcomputers

Operations research

Consumer products

Industry and manufacturing

Supply chain management

Command and control

Computer-aided manufacturing

Decision analysis

Transportation

Forecasting

Marketing

Education

Digital libraries and archives

Computer-assisted instruction

Interactive learning environments

Collaborative learning

Learning management systems

Distance learning

E-learning

Computer-managed instruction

Document management and text processing

Document searching

Document management

Text editing

Version control

Document metadata

Document capture

Document analysis

Document scanning

Graphics recognition and interpretation

Optical character recognition

Online handwriting recognition

Document preparation

Markup languages

Extensible Markup Language (XML)

Hypertext languages

Annotation

Format and notation

Multi / mixed media creation

Image composition

Hypertext / hypermedia creation

Document scripting languages

## Social and professional topics

Professional topics

Computing industry

Industry statistics

Computer manufacturing

Sustainability

Management of computing and information systems

Project and people management

Project management techniques

Project staffing

Systems planning

Systems analysis and design

Systems development

Computer and information systems training

Implementation management

Hardware selection

Computing equipment management

Pricing and resource allocation

Software management

Software maintenance

Software selection and adaptation

System management

Centralization / decentralization

Technology audits

Quality assurance

Network operations

File systems management

Information system economics

History of computing

Historical people

History of hardware

History of software

History of programming languages

History of computing theory

Computing education

Computational thinking

Accreditation

Model curricula

Computing education programs

Information systems education

Computer science education

CS1

Computer engineering education

Information technology education

Information science education

Computational science and engineering education

Software engineering education

Informal education

Computing literacy

Student assessment

K-12 education

Adult education

Computing and business

Employment issues

Automation

Computer supported cooperative work

Economic impact

Offshoring

Reengineering

Socio-technical systems

Computing profession

Codes of ethics

Employment issues

Funding

Computing occupations

Computing organizations

Testing, certification and licensing

Assistive technologies

Computing / technology policy

Intellectual property

Digital rights management

Copyrights

Software reverse engineering

Patents

Trademarks

Internet governance / domain names

Licensing

Treaties

Database protection laws

Secondary liability

Soft intellectual property

Hardware reverse engineering

Privacy policies

Censorship

Pornography

Hate speech

Political speech

Technology and censorship

Censoring filters

Surveillance

Governmental surveillance

Corporate surveillance

Commerce policy

Taxation

Transborder data flow

Antitrust and competition

Governmental regulations

Online auctions policy

Consumer products policy

Network access control

Censoring filters

Broadband access

Net neutrality

Network access restrictions

Age-based restrictions

Acceptable use policy restrictions

Universal access

Computer crime

Social engineering attacks

Spoofing attacks

Phishing

Identity theft

Financial crime

Malware / spyware crime

Government technology policy

Governmental regulations

Import / export controls

Medical information policy

Medical records

Personal health records

Genetic information

Patient privacy

Health information exchanges

Medical technologies

Remote medicine

User characteristics

Race and ethnicity

Religious orientation

Gender

Men

Women

Sexual orientation

People with disabilities

Geographic characteristics

Cultural characteristics

Age

Children

Seniors

Adolescents

## Proper nouns: People, technologies and companies

Companies

Accenture

Adobe Systems Incorporated

Advanced Information Systems

Agere Systems, Inc.

Agilent Technologies

Alcatel-Lucent

Bell Labs

AOL, Inc.

Apple, Inc.

AT&T

BAE Systems

BEA Systems, Inc.

Blizzard Entertainment

Blue Sky Studios

Borland Software Corporation

CA Technologies

Cable & Wireless Worldwide

Cadence Design Systems

China Telecom Corporation Limited

Cisco Systems, Inc.

Citrix Systems, Inc.

Commerce One

Compaq Computer Corporation

Corel Corporation

Dell Computer Corporation

DiamondCluster International, Inc.

Digital Equipment Corporation

eBay Inc.

EIS, Inc.

EMC Corporation

Ericsson

Ernst & Young

Forrester Research

Gartner Group

General Dynamics

General Electric

Google Inc.

Hewlett-Packard Company

HP Labs

Infineon Technologies

Infusion

Intel Corporation

International Business Machines Corporation

IBM Almaden Research Center

The IBM Toronto Software Lab

International Data Corporation (IDC)

Internet Corporation for Assigned Names and Numbers

Iona Technologies

ITSS, Inc.

Juniper Networks

Lockheed Martin Corporation

Macromedia

McKinsey & Company

Microsoft Corporation

Motorola, Inc.

Motorola Mobility, Inc.

Motorola Solutions, Inc.

Mozilla Corporation

National Instruments Corporation

Nokia Corporation

Nortel Networks Corporation

Novell, Inc.

NVIDIA Corporation

Oracle Corporation

Sun Microsystems

Philips Semiconductors

NXP Semiconductors

Pixar Animation Studios

Quest Software, Inc.

Rational Software Corporation

Research in Motion Limited

RSA

SANS Institute

SAS Institute, Inc.

Sega Corporation

Siemens AG

Silicon Graphics, Inc.

Sony Corporation

SRI International

Standard Performance Evaluation Corporation

Taiwan Semiconductor Manufacturing Company, Limited

Telcordia Technologies

Texas Instruments Inc.

The Standish Group International, Inc.

Toshiba Corporation

Virage Logic

Virtual University Enterprises

Xerox Corporation

PARC

Yahoo! Inc.

Zilog, Inc.

Organizations

ABET, Inc.

Computing Accreditation Commission

American Mathematical Society

American National Standards Institute

American Statistical Association

Ames Research Center

Apache Software Foundation

Argonne National Laboratory

Association for Computing Machinery

Association for Information Systems

Brazilian Computer Society

British Computer Society

Clay Mathematics Institute

Charles Babbage Institute

Computer History Museum

Computer Press Association

Computing Community Consortium

Computing Research Association

Computing Technology Industry Association

Computer Science Teachers Association

Courant Institute of Mathematical Sciences

CSAB

Defense Advanced Research Projects Agency

Eclipse Foundation

Electronic Frontier Foundation

Electronic Visualization Laboratory

European Network and Information Security Agency

European Telecommunications Standards Institute

Federal Communications Commission

Free Software Foundation

Human Factors and Ergonomics Society

IEEE Computer Society

Test Technology Technical Council

International Computer Music Association

International Game Developers Association

International Organization for Standardization

International Software Benchmarking Standards Group Limited

ITU

Isaac Newton Institute for Mathematical Sciences

JISC

Jet Propulsion Laboratory

Joint Photographic Experts Group

Langley Research Center

Lawrence Berkeley National Laboratory

Lawrence Livermore National Laboratory

Linux Professional Institute

London Mathematical Society

Los Alamos National Laboratory

Massachusetts Institute of Technology

MIT Media Lab

Personal Robots Group

Max Planck Institutes

Moving Picture Experts Group

Mozilla Foundation

National Academy of Engineering

National Academy of Sciences

National Center for Education Statistics

National Institute of Standards and Technology

National Institutes of Health

National Research Council

National Science Foundation

Oak Ridge National Laboratory

Object Management Group

Open Network Laboratory

OSGi Alliance

Operational Research Society

Open Knowledge Society

Open Source Initiative

Pacific Northwest National Laboratory

Patent and Trademark Office

Royal Statistical Society

San Diego Supercomputer Center

Sandia National Laboratories

Semiconductor Industry Association

Software Engineering Institute

SLAC National Accelerator Laboratory

Systems Research Center

TDWI

The Open Group

Transaction Processing Performance Council

Trusted Computing Group

Viewpoints Research Institute

Wikimedia Foundation, Inc.

World Intellectual Property Organization

World Wide Web Consortium

People in computing

A. van Wijngaarden

Ada Lovelace

Alan Cooper

Alan Curtis Kay

Alan J. Perlis

Alan Mathison Turing

Allen Kent

Allen Newell

An'an Wang

Andrew S. Grove

Barbara Liskov

Barry W. Boehm

Bill Gates

Bill Joy

Bill Millard

Bjarne Stroustrup

Blaise Pascal

Bruce Schneier

C. A. R. Hoare

Charles Babbage

Charles Tandy

Claude Elwood Shannon

Clive Sinclair

Cyril W. Cleverdon

David Hilbert

David Patterson

David Sarnoff

Donald Ervin Knuth

Douglas R. Hofstadter

Edmund Callis Berkeley

Edvard Scheutz

Elliot Irving Organick

Gary McGraw

Georg Scheutz

Gene H. Golub

Gordon Bell

Grace Murray Hopper

H. D. Goode

Harry H. Goode

Harvey M. Deitel

Herbert A. Simon

Herbert R. J. Grosch

Herman H. Goldstine

Herman Hollerith

Ivar Jacobson

James Gosling

J. H. Wilkinson

J. Presper Eckert

J. Richard Buchi

Jakob Nielsen

Jay Wright Forrester

Jim Blinn

Jim Gray

John Vincent Atanasoff

John Cocke

John McCarthy

John R. Pasta

John Sculley

John Von Neumann

John W. Mauchly

Jon Kleinberg

Kazimierz Kuratowski

Kent Beck

Konrad Zuse

Kurt Godel

Linus Torvalds

Marian Smoluchowski

Mark D. Weiser

Martin Fowler

Marvin Lee Minsky

Maurice V. Wilkes

Peter J. Denning

Peter Norton

R. Milner

Richard M. Karp

Robert R. Everett

Seymour Papert

Stefan Banach

Steve Jobs

Thomas J. Watson

Thomas Watson, Jr.

Vannevar Bush

William C. Norris

Technologies

ActionScript

ActiveX

Ada language

ANSI C

Ajax

AppleScript

AutoCAD

BASIC

Bluetooth

Business Process Execution Language

CDMA systems

Cell Broadband Engine

CMOS

CORBA

Datalog

DB2

DNS (Domain Name System)

DOS

Dreamweaver

DSL

DSM

DVDs

Eclipse

Ethernet

Excel

CD-ROMs

Facebook

Internet Explorer

Chrome

Firefox

Flickr

Fortran

FreeBSD

Gmail

Google Earth

Google

Google Maps

Google Scholar

GSM

Haskell

HDTV

HP-UX

InfiniBand

IP Multimedia Subsystem

iPad

iPhone

iPod

IPTV

IPv6

JAVA ME

JavaScript

JPEG

JSP

LAPACK

Linux

Lotus Notes

Macintosh OS

Macintosh

Mathematica

MATLAB

MIMO Systems

Mobile IP

WiMAX

MODIS

MP3

MS-DOS

MSN (portal)

Myspace

MySQL

NetWare

OFDM System

Office

OpenMP

Oracle Database

Outlook

PDF

Pentium

Photoshop

PlanetLab

Pocket PC

PowerPC

PowerPoint

Prolog

QuarkXPress

QuickBooks

Quicken

QuickTime

Ruby on Rails

RISC processors

Samba

SELinux

SharePoint

SIMD architectures

Simulink

Smalltalk

Short Message Service

SNMP

Solaris

SONET

SPARC

SQL Server

Secure Sockets Layer

Skype

TMS320C

Transport Layer Security

TREC

Twitter

UMTS

Unicode

Usenet

UWB

VHDL

Visual Basic

VMware

VoiceXML

VRML

Wifi

Wikipedia

Windows

Windows environment

WordNet

X-Window

X3D

XILINX

Yahoo! (portal)

YouTube

ZigBee