Object-oriented Issues

A Literature Review[1]

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Abstract

Papers dealing with object-oriented issues are grouped according to whether they are concerned with languages and systems or applications. Papers dealing with related issues are also listed. An alphabetical bibliography is given at the end. Some effort has been made to discard obsolete or hard-to-find papers.

1 Language and Systems.

In this section we list programming languages and systems that display some object-oriented concepts.

ABCL/1: A concurrent object-oriented programming language that sits on top of Lisp. Tokyo Institute of Technology. [Yone86]

Actor languages: There is a number of actor-based languages from Hewitt's group at MIT. Some of these display varying degrees of object-orientedness. [Byrd82 Ther83]

Argus: Language with resilient objects and nested atomic transactions. Descendent of Clu. See also papers on reliability and recovery. [Lisk83a Weih82]

Beta: Programming language with data abstraction from Oslo. Derived from Simula. [BETA83 BETA85 Kris83]

C++: An object-oriented "extension" to C from Bell Labs. [Stro84a Stro84b Stro84c Stro84d Stro86a Stro86b]

Clouds: Distributed object-oriented operating system. Martin McKendry at Georgia Tech. [Dasg86]

CommonLoops: Another object-oriented Lisp. Xerox PARC. [Bobr86]

CommonObjects: An object-oriented extension to Common Lisp, from Hewlett-Packard Labs. [Snyd86a]

ConcurrentSmalltalk: A concurrent extension to Smalltalk from Keio University, Japan. [Yoko86]

Eiffel: Statically-typed programming language with multiple inheritance and "genericity" (a la Ada). U Cal, Santa Barbara. [Meye86]

Encore: An "object management system" from Brown University. [Zdon85]

Emerald: An "object-based" language for distributed applications, with data abstraction and strong-typing. University of Washington. [Blac86]

[1]In *Objects and Things*, ed. D.C. Tsichritzis, Centre Universitaire d'Informatique, University of Geneva, March 1987, pp. 183-206.

Flavors: Lisp with object classes and multiple inheritance. There are now many flavours of flavors. [Moon86 Wein81]

Galileo: An interactive object-oriented language from Pisa University. Objects in Galileo are persistent. [Alba85]

Gemstone: An "object-oriented database system" from Servio Logic. Also check Jan 1987 TOOIS. [Maie85]

Hybrid: A programming language with multiple inheritance and "active objects". University of Geneva. [Nier85c Nier85d Nier87a Nier87c]

Jasmine: An object-oriented system with inheritance, persistent objects and transactions. University of Washington. [Wieb86]

LOOPS: A logic object-oriented language with multiple inheritance. [Mitt86 Stef83]

Mach: Capability-based Unix for object-oriented programming. Carnegie-Mellon. [Jone86]

Mesa: Programming language with monitors to which multiple inheritance (a la "traits") were added. Used in the implementation of the Xerox "Star" workstation. [Curr82 Gesc77 Mitc79 Lamp80]

ModPascal: An object-oriented Pascal. From the University of Kaiserslautern, Germany. [Olth86]

Oaklisp: Another object-oriented lisp with message-passing and inheritance. From Carnegie-Mellon. [Lang86]

OOCL: An Object-Oriented Command Language. [Snod83]

Objective C: Descendent of OOPC, an object-oriented dialect of C. [Cox83 Cox84 Cox86]

OPAL: Object-oriented system from Syslab, University of Stockholm. [Ahls84a Ahls85]

Orient84/K: An object-oriented concurrent programming language for describing knowledge systems, written in C and Lisp. From Keio University, Japan. [Ishi86 Toko86]

Oz: Object-oriented system for OIS applications from UofT. Ancestor of Hybrid. [Moon84 Nier83a Nier85a Twai84 Weis85]

Poise: A CAD/CAM object management system. [Croft85]

POOL: "Parallel Object Oriented Language" from Philips, Eindhoven. Actually a "family" of languages for programming message-passing, process-like objects.

Quicktalk: A compilable dialect of Smalltalk, from Tektronix. [Ball86]

Simula: A simulation language with object classes. [Birt73]

Smalltalk: Programming language and environment from Xerox PARC. Some references detail experinces with implementation details. [Atki86 BYTE81 Born82a Born82b Caud86 Deco86 Deut84 Gold80b Gold83 Gold84 John86 Kaeh86 Kras83 Pasc86 Tesl81 Vegd86]

Smallworld: Smalltalk descendent from IBM Yorktown. [Laff85]

Spool: A Prolog-based object-oriented language from IBM Japan. [Fuku86]

Squeak: An object-oriented language for communicating with mice. [Card85a]

Strobe: A language providing object-oriented support for Lisp. See also Impulse-86. [Smit83]

Taxis: A data modelling language with augmented Petri nets controlling transactions; from UofT. [Barr82 Mylo80a]

Trellis/Owl: An "object-based" language with multiple inheritance and static type-checking. DEC, Massachusetts. [Scha86]

Vulcan: An object-oriented pre-processor for Concurrent Prolog. Xerox PARC. [Kahn86]

2 Other languages.

The following languages are of interest, though they do not claim to be object-oriented.

Ada: Ada has user-definable types and some data abstraction mechanisms. [Ada83 Barn80 Bruno86]

CLU: Programming language with data abstraction from MIT. [Lisk77]

Alphard: Another language with some data abstraction. [Shaw77]

Modula: Descendent of Pascal with monitor-like modules. [Wirt83]

3 Applications.

The following list includes work that employs object-oriented concepts, and applications written in object-oriented languages.

AAIS: CAD environment written in Smalltalk, from Tektronix. [Mill86]

ASP: Spreadsheet package written in Smalltalk, from Xerox. [Pier86]

Bridge: Also "The Invisible Hand", "Ohm" and "Eureka". A collection of tutoring systems written in LOOPS, from the University of Pittsburgh. [Bona86]

Flamingo: A window management system implemented in C under Mach (a version of Unix). Carnegie-Mellon. [Ande86]

Garden: A graphical programming system from Brown University. [Reis86]

Hypertext: There are various "hypertext" or "electronic encyclopedia" proposals and prototypes. Object-oriented implementation is a natural. [Cook84 Weye85]

Impulse-86: A "substrate" for building user interfaces, written in Strobe. Schlumberger-Doll, Connecticut. [Smit86]

Intermedia: A Hypertext system from Brown University. Also see "Interval". [Meyr86]

Interval: A "timeline editor" within the Intermedia system from Brown. [Garr86]

Knos: Knos are "Knowledge acquisition, dissemination and manipulation objects", implemented in terms of active objects. See also "Hybrid". [Tsic85b Tsic85c Tsic85d]

Lisa: Apple's Lisa is heavily based on Smalltalk. [Will83]

Macintosh: The Apple Macintosh has a Smalltalk-like interface, and the system software (particularly the window system) is claimed to be "fully object-oriented", though it is written in Pascal. [Will84]

Music: These two papers discuss object-oriented programming in music systems. [Kras80 Lieb82]

ODA: The "Office Document Architecture" is an ECMA standard for encoding office documents. It has an object-oriented flavour. [ECMA83 Hora84 Hora85]

Omega: A language for building expert systems. [Atta85b]

Paint: Objects and user interfaces; specifically, using Thoth's message-passing to implement a paint system. [Beac82]

Pi: Case study of a debugger written in C++. AT&T Bell Labs. [Carg86]

Radiation: A system (unnamed) to simulate radiation therapy for cancer. Written in Pascal using object-oriented design. University of Washington. [Jack86]

Star: The implementation of the Xerox Star made use of object-oriented concepts, in particular, multiple inheritance ("traits") with the Mesa programming language, and direct manipulation user interface a la Smalltalk. [Curr84 Smit82b]

Thinglab: A "constraint-oriented simulation laboratory" written in Smalltalk. Stanford and Xerox PARC. [Born81]

Unix: An object-oriented interface to Unix, from Tektronix. [Ewin86]

Views: A system for algebraic manipulation, written in Smalltalk. From Tektronix. [Abda86]

Virtual Instruments: An experimental programming environment for developing electronic test and measurement applications. Written in Berkeley Smalltalk on Suns. Polytechnic State University, California. [Bhas86]

4 Related issues.

The following papers deal with a number of issues that are more-or-less related to object-orientedness.

Architecture: There have been some attempts to argue that special architectures may be more appropriate to support object-oriented systems. Compare with Smalltalk experience papers, and actor/message-passing architectures. [Lewi86 Patt83 Samp86 Snyd79 Unga84]

Concepts: There are an increasing number of papers discussing various object-oriented concepts. See also survey papers and special issues, and papers on types and on data abstraction, [Borg86 Cunn86 Gogu86 Hend86 Khos86 Lalo86 Lieb86 Mads86 Nguy86 Ossh86 Sand86 Snyd86b Stro86c Wegn86]

Concurrency: These papers discuss various mechanisms and formalisms for coping with concurrency (CSP, monitors, etc.). The Andrews survey is excellent. [Andr81 Andr83 Bern81 Brin72 Brin73 Brin78 Broo84 Dijk75 Hoar74 Hoar78 Lamp83 Nier87b Shoc82 Silb84 Upfa84]

Data Abstraction: These papers explain various aspects of data abstraction. See also papers on languages with data abstraction mechanisms, and some of the papers on types. [Gutt77 Ledg77 Smit77a Smit77b]

Distribution: Papers on distributed problems are also mixed in with those on concurrency, reliability, and transactions. [Bada86 Jaco86 Tane85]

Object management: These papers talk about "object-oriented databases" and databases for managing objects. The Oppen paper discusses object naming issues. [Baro81 Derr85 Gold80a Lyng84 Maie86 McLe85 Oppe83 Skar86 Zdon84 Zdon86a]

Memory: These are all papers on garbage collection. The Almes paper specifically addresses object-oriented systems. There is also some material in the Krasner Smalltalk book. [Alme80 Deut76 Dijk78 Lieb81]

Message-passing: Actors are processes that communicate by passing messages, and specifying a "replacement" for themselves when an "event" (i.e., the arrival of a message) takes place. Most of the work on actors has come from MIT though there are others who have adopted the paradigm. Message-passing is also present in non-actor systems such as Smalltalk and Thoth (see the Gentleman paper). See also "Actor languages". [Agha85 Agha86 Bake78 Ferb83 Gent81 Hewi77a Hewi77b Jong86 Zimm84]

OIS: Some object-oriented modelling of office information systems. [Gibb82 Gibb84 Woo85b Woo86]

Reliability: Various papers on aspects of reliability, resilience, recovery and fault-tolerance. [Haer83 Kohl81 Oki83 Shin84 Svob84 Verh78]

Security: Security issues for objects seem to be well-addressed by capabilities. The Hydra system contains some interesting ideas. The Landwehr paper is a survey of various techniques and paradigms. [Cohe75 Fabr74 Land81 Wulf74]

Surveys: The following are surveys of various object-oriented systems and concepts, or special issues. See also concepts. [Benn82 BYTE86 Nier86 Nyga86 Obj85 Obj86 Oops86 Stef85 Stoy84]

Transactions: The notion of transactions and atomic actions, particularly nested transactions, is relevant to environments with many concurrent active objects. Nested transactions are available in the Argus system. See also papers on concurrency and reliability. [Gray81 Lamp81 Moss81 Moss82 Moss83]

Types: Various papers dealing with data types. See also papers on data abstraction. [Alle86 Bruc86 Card85b Grie77 Inga86 Wall80 Zdon86b]

UIMS: How object-oriented ideas can be applied in the development of user interfaces. [Fium83]

5 Unreferenced.

The following list includes systems and work for which no references have yet been found.

ARCHONS: Contact Doug Jensen at CMU. ARPA: jensen@cmu-cs-a.

Demeter: Tool for generating object-oriented environments from grammars. Based on GEM. Lieberherr, Northeastern University.

Eden: Distributed object system from University of Washington. See recent ACM TOCS or TOPLAS.

Iris: An object-oriented DBMS from HP Labs, Palo Alto. Check TOOIS, Jan 1987.

KOOL: "Knowledge Object Oriented Language" from Bull.

ODBS: An object-oriented database system. Check Jan 1987 TOOIS.

other ...: Work by Bolt-Beranek & Newman, Cambridge. See also ICDCS.

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