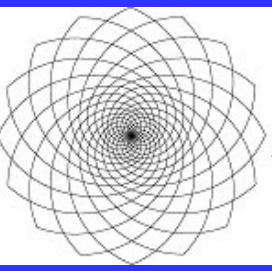

AllegroCache™

AllegroCache alpha 0.7.4 yaoodb

By

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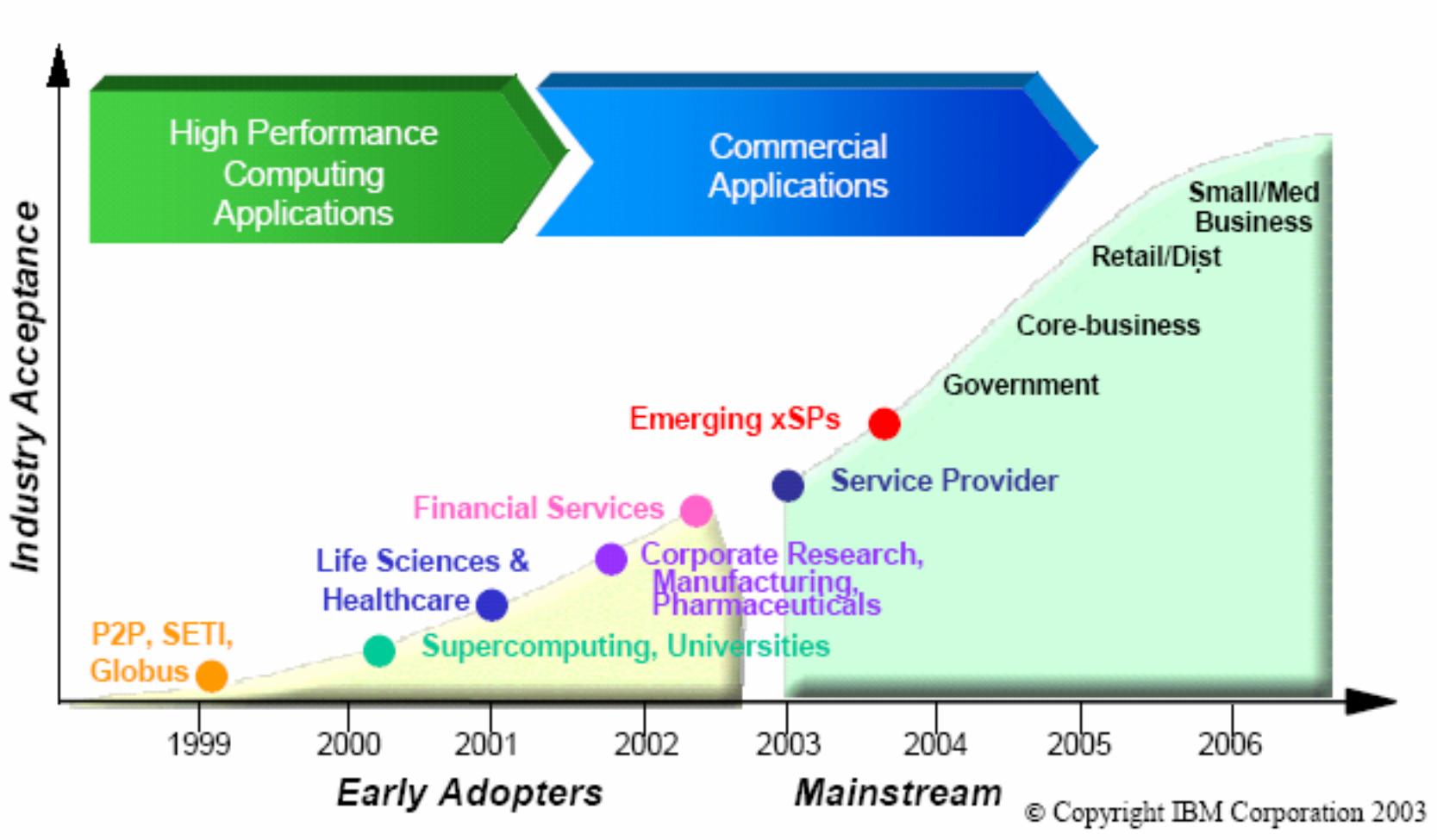
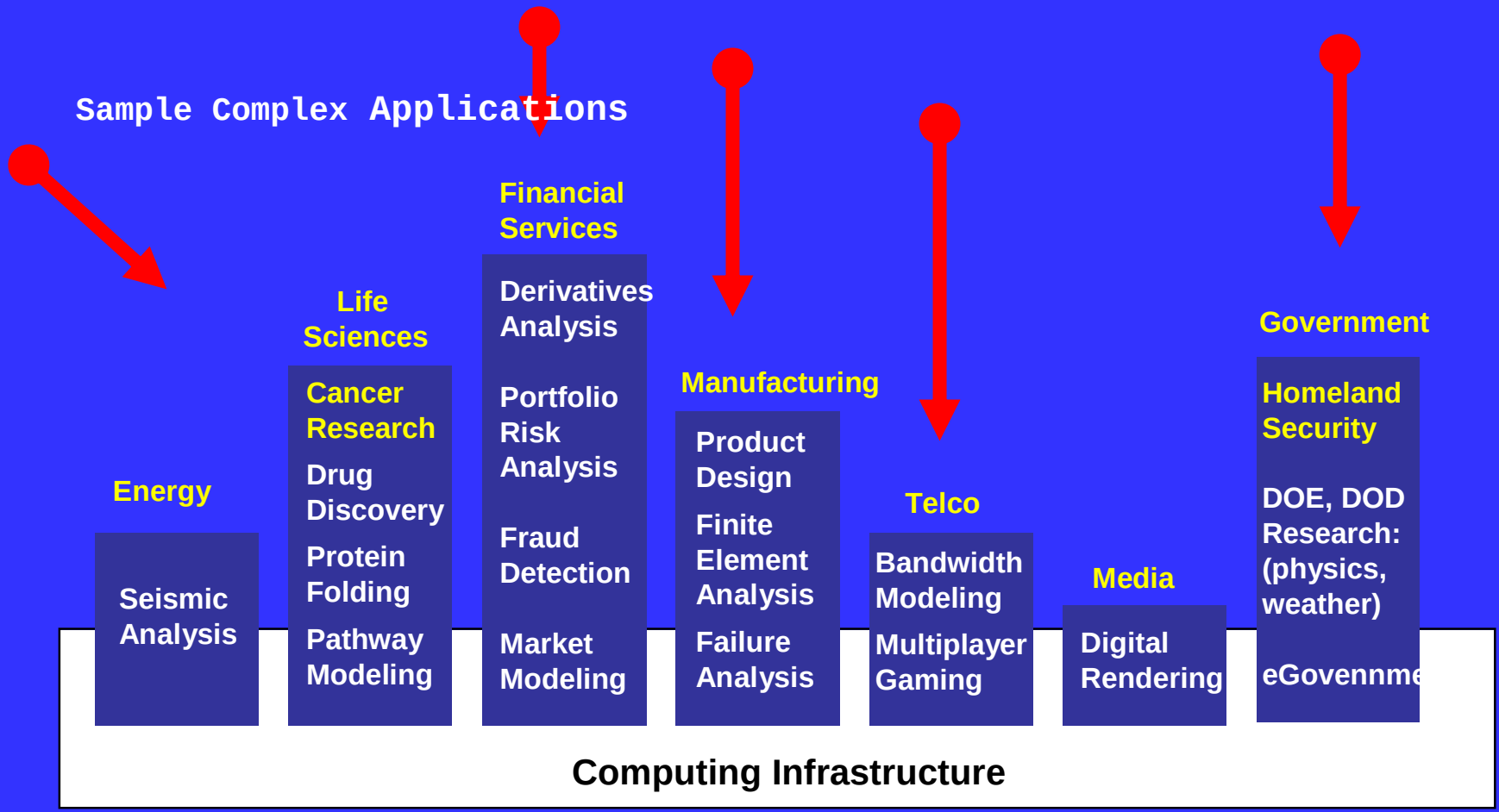
Complexity is coming your way



Our customers have complex database problems everywhere



Big push for ORM as part of solution

- Hibernate for Java
- Versant for .NET
- Oracle's OO extentions
- CLSQL for Lisp
- …

- However: these are user friendly thin layers on top of RDBMS that don't solve the real complexity problem

Why a full OO, Why Allegrocache

- If your data is best described as a complex graph
- Graph many times larger than Memory
  - > 10^8 objects in pointer space
- Graph search & Complex queries & Inferencing & Reasoning
  - Instead of set operations
- Very heterogeneous data, possibly in multiple databases
- Object definitions often change
- Intelligent Caching
  - More reads than writes, ultra fast access to individual records.

AllegroCache from a modern database perspective

- Stand-alone & Client Server model
  - Single user on local disk
  - Multiple clients talking to server over sockets
- Commit/Rollback
- ACID
  - Atomicity (all or nothing)
  - Consistency (or rollback)
  - Isolation (multiple transactions will not interfere)
  - Durability
- Optimistic concurrency

AllegroCache for Lispers

- Persistent CLOS on all 64 and 32 bit platforms
- Lisp Btrees (previously Berkeley DB)
  - Floating cursors, multiple concurrent readers
  - Keys and Values are unsigned byte 8 arrays of unlimited size
  - Comparison functions in Lisp
  - Comprehensive marshalling package for most datatypes
  - Fine grained dynamic control over btree cache size
    - resourced blocks, almost no consing..
  - Comparable to BDB in speed and functionality
    - 130,000 key/value pairs per second for increasing keys, 66,000 for unordered (mostly disk bound now)

Features from (lisp) programmer perspective

- MetaClass persistent-class.
- Change class-definition supported
  - lazy update of objects
- Class definitions are first class objects in AC
- Object ID's unique for the life time of the database
  - and user accessible.
- Indexed slots
- Referential integrity
  - Deleted objects are lazily and silently changed to nil in slots.

Features for programmers (cont)

- Maps (persistent hashtables) & Sets (persistent large collections of objects)
  - Transactionally safe
  - And convenient macro's to loop over them.

- Support main Lisp datatypes
  - Strings, lists, vectors, symbols, numbers
  - Persistent objects, Maps, Sets
  - Unsigned byte 8 arrays (for your structs and non-persistent clos objects and all other data)
  - Tell us what you need and we build it for you

Features for programmers (cont)

- Several ways to retrieve objects and object ids (oid)
  - (retrieve-from-index ‘person ‘name “jans”)
  - (doclass (e ‘person)
    (when (string= (name e) “jans”)
    (print)))
  - (setf person (oid-to-object ‘person 100))
  - (name (country (city person))

Features for programmers (cont)

- Prolog as efficient higher level retrieval language
- Real soon full SQL support (courtesy of Intelligent Handbook)
- Simple webbased database browser

Current todo list

- Caching strategies and user defined caching rules
- Index range queries
- Rebuilding indexes when redefining classes
- Dumping the database into a readable format
- Restore database from the dump
- Internationalization (99 % done)
- Journaling

To Do for 1.1

- Support for automatic blobs
- User defined indexes for slots and maps
- Query language running in the cache
- Integration with other dbms
  - (automatically reading in tables from relational databases)
  - Using rdbms for secondary storage.
- A hook for marshalling your own datatypes
- Thick Client GUI for creating objects, managing users and the database.

Premature Benchmarking

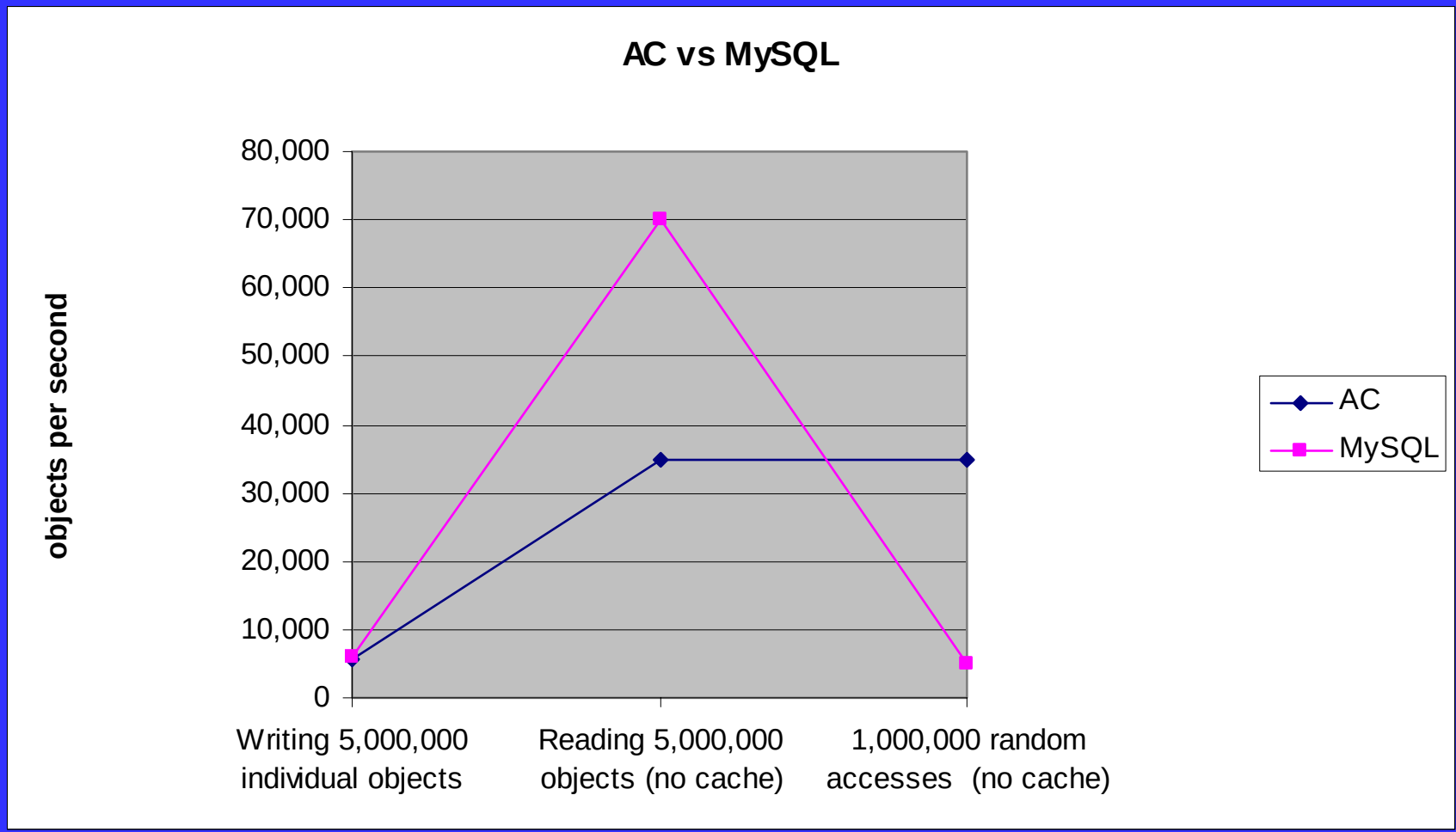
- 1,000,000,000 objects in 12 hours in stand alone mode.
  - Small objects, two slots, no overflow blocks in btree.., no indexing apart from oid
- Adding objects in constant time, nearly 18.000 obj/s
- Retrieving objects constant time, independent of size..
- Lisp size doesn't grow beyond 260 MB
- Database on disk is 97 Gb

Premature benchmarking. AC alpha 0.7.4 vs MySQL on 64 bit, 1.5 Ghz, 4 Gig linux machine

```
(defclass* call-data ()
    ((call_number
        :index :any-unique)
     action
     from_user
     to_user
     time_start
     time_spoken
     amount
     balance
     description))
```

```
create table call
  (call_number          int
   primary key auto_increment,
   action               int,
   from_user            int,
   to_user              int,
   time_start           int,
   time_spoken          int,
   amount               int,
   balance              int,
   description
        varchar(200)
   );
```

Premature benchmarking. AC alpha 0.7.4 vs MySQL (cont)



Our expectations for raw speed

- Given our past performance on raw speed for Perl Regexp, Validating XML parser, AllegroServe, Prolog, etc

- Writing: within range of MySQL and Oracle
- Reading: Looping through all objects in AC always slower, RDBMS can often bypass btrees, read tables with fixed size..
  - RDB: good at set operations
  - OO: good at pointer operations
- Random Access, 5 to10 times faster than RDBMS

Applications & Prototypes

- Biolingua: A frame system on top of AC, the basis of KnowOs
- Pepito: data mining package on AC*
- TellMe: personal directory for mobile phones
- Kido: Fraud detection over Call Detail Records
- KDDI: Rule Based Policy Server for Security using OWL and Racer.
- CRL: P2P document server, a secure webserver.
- 2Is Inc. WinStoic - Real-time, Data mining and EDI Contract Analysis System supporting Department of Defense Weapons Systems
- Boomtree: Web-based RSS reader based on Flash that can play 'podcasts' in the browser.
- Franz: Geneology Royal British Family, Tivo Box, 90.000 RSS feeds, Pandorabots, Internal CRM package, Support Database