Software Architectures

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Three Paradigms

- Mainframes
- Desktops
- Networks

Mainframe Introduced Concepts

- Algorithms and Data Structure
- Subroutine
- Abstract Data Type (ADT)
- Libraries
- Dispatch Vector
- Run Time Library

Subroutine Architecture

Main Program and Procedures

Layered
Mainframe Introduced Concepts

- One Big Computer
- Processor
- Process
- One Address Space
- Global Memory
- Local Memory
- Batch
- Time-sharing
- Scripting Languages
- Call Frame Stack
- Lock

Process Architecture

Batch Sequential

Pipes and Filters

Mainframe Introduced Concepts

- Instruction Set Architecture
- Binary
- Executable Image
- Interrupt Error Handling
- Message Queue Based I/O
- Security - Identity
- Tools: YACC, Lex
- Standards
- File System
Desktop Influenced Concepts

- Many Desktop Machines with a Back End Server
- Objects
- GUI
- Event Loops
- Threads
- Multiple Address Spaces
- Remote Procedure Call (RPC)
- Instruction Set Architecture
- Universal Binary
- Relational Databases / Transaction Monitor
- CASE Tools - Netra, PowerBuilder
- Client/Server
- Standards
- Distributed File Systems

Event Systems

Transaction Systems

Object-Oriented Systems

Basic Client/Server

Three Tiered Client/Server
Network Introduced Concepts

- Universal Name Space
- Mobile/Timed Client/Server
- Universal Language (Uwa)
- Authentication - Single Sign
- Authorization
- Data Privacy - Encryption
- Data Integrity - MD5
- Static-Less Computations
- Non-Static-Less Computations
- Protocols
- Standards
- Security Paradigm: Protect, Detect, Confide, Retain
- Distributed Management

Network Environment

MEDIATOR ARCHITECTURE

MEMBER EXAMPLE OF CLIENT/SERVER

CLIENT/SERVER NETWORK PLACEMENT

PUBLISH/SUBSCRIBE

SMTP BASE ELECTRONIC EMAIL

ASCII, MIME, pgp, x509, ...
HTTP based Web Example of Client/Server

get http://cy~ron

CS

HTTP

web server directory

web client

SSL

db

HTML

Autonomous Process Composition

- CHAIMS project
- Language of process composition
- Supports DCE, Corba, DCOM, RMI, ...
- Compiler
- Legacy Wrappers
- At Prototype Status

CHAIMS

Architecture: Overview

Distributed Architectures

- The architecture of a system is the components, their interfaces, communication, and contranational behavior.
- DADL (Distributed Architecture Definition Language)
  - Programming language for architectures.

A DADL Environment

DADL Development

Environmental services such as authentication, authorization, data privacy, data integrity, monitoring, persistence management, replication, transaction processing, distributed lock management, databases, and GUI systems.

DADL Compiler

- DADL Source
- Conversation Service

DADL Application

- DADL Application
- Library

Conversation Service

- Library
- Conversation Application
DADL Example Program: Plus

alphabet (byte);
connection cl (1-to-1, ordered, guaranteed)
connection c2 (1-to-1, ordered, guaranteed)
term t1 (int);
term t2 (int);
sentence s1 (t1, t2) from c1 to c2;
term t3 (int plus(int, int));
sentence s2 (t3) from c2 to c1;
behavior (s1; s2);
contract volatile, open, marshaled, authenticated, authorized