Software Architectures

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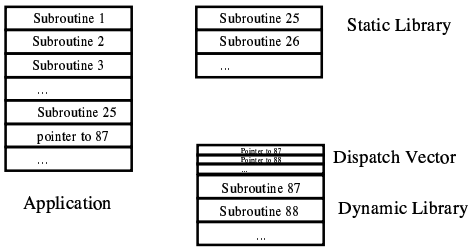
Three Paradigms

- Mainframes
- Desktops
- Networks

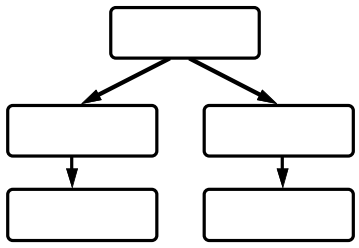
Mainframe Introduced Concepts

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

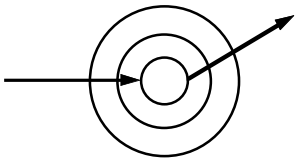
Subroutine Architecture



Main Program and Procedures



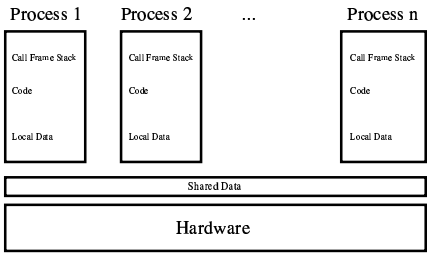
Layered



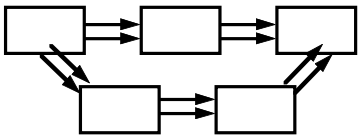
Mainframe Introduced Concepts

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

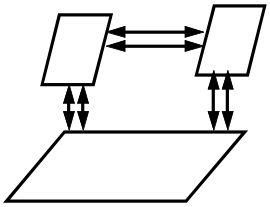
Process Architecture



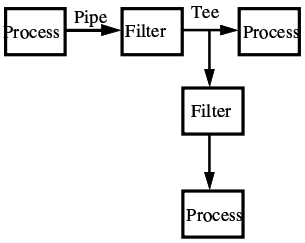
Batch Sequential



Communicating Processes



Pipes and Filters



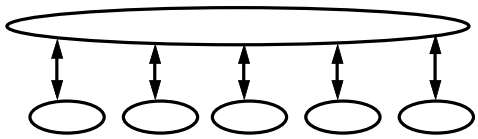
Mainframe Introduced Concepts

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

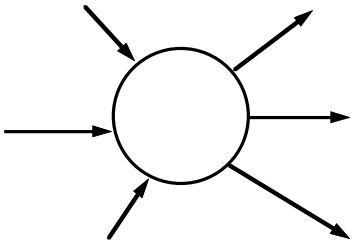
Desktop Influenced Concepts

- 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 - Nextstep, PowerBuilder
- Client/Server
- Standards
- Distributed File Systems

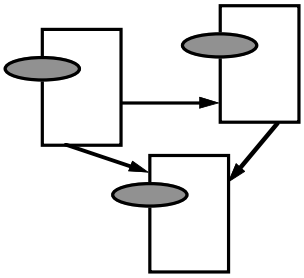
Event Systems



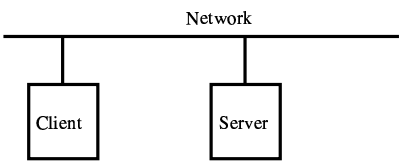
Transaction Systems



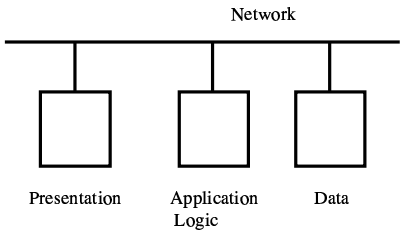
Object-Oriented Systems



Basic Client/Server



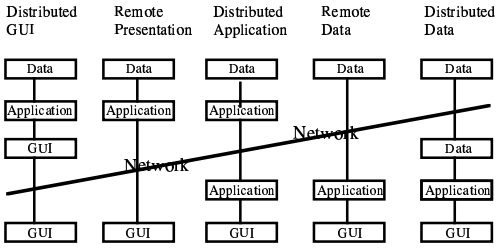
Three Tiered Client/Server



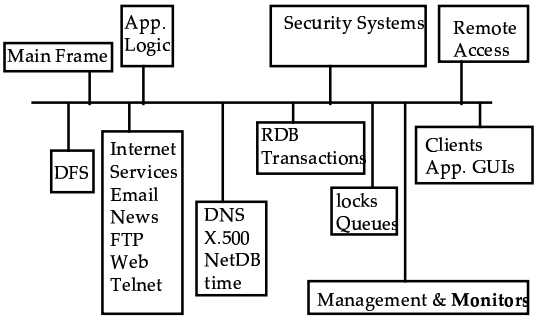
Network Introduced Concepts

- Universal Name Space
- Multi-Tiered Client Server
- Universal Language (Java)
- Authentication - Single Site
- Authorization
- Data Privacy - Encryption
- Data Integrity - MD5
- State-Less Computations
- Near-State Less Computations
- Protocols
- Standards
- Security Paradigm: Protect, Detect, Confine, Return
- Distributed Management

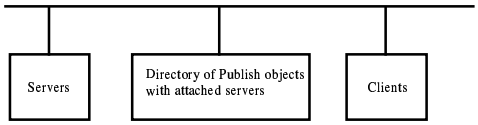
Client/Server Network Placement



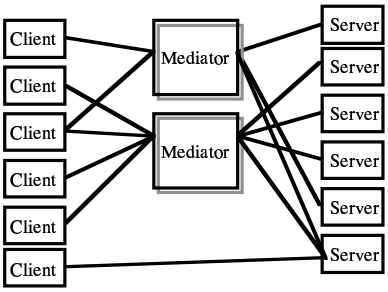
Network Environment



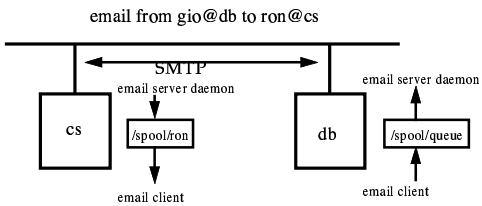
Publish/Subscribe



Mediator Architecture

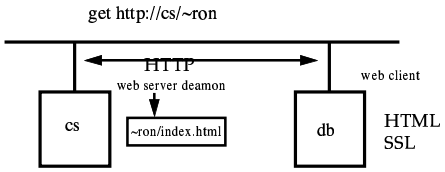


SMTP base Electronic Email Example of Client/Server



ASCII, MIME, pgp, x509, ...

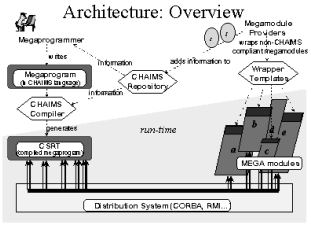
HTTP based Web Example of Client/Server



Autonomous Process Composition

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

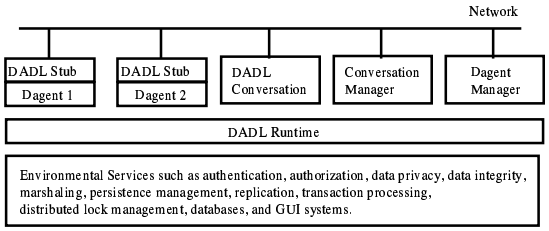
CHAIMS



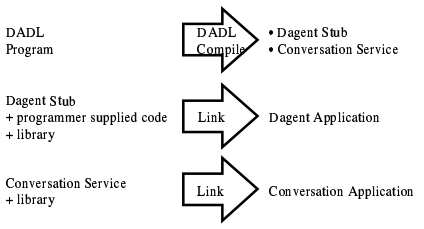
Distributed Architectures

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

A DADL Environment



DADL Development



DADL Example Program: Plus

```
alphabet (byte);
connection c1 (1-to-1, ordered, guaranteed)
connection c2 (1-to-1, ordered, guaranteed)
term t1 (int n);
term t2 (int m);
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, marshed, authenticated, authorized
```