



Distributed Systems

Y. V. Lokeswari AP / CSE

Reference: George Coulouris, Jean Dollimore and Tim
Kindberg, “Distributed Systems Concepts and Design”, Fifth
Edition, Pearson Education, 2012





Overview

- Introduction
- Examples of Distributed Systems
- Trends in Distributed Systems
- Focus on Resource sharing





Distributed Systems

- Distributed system is one in which hardware or software components located at networked computers communicate and coordinate their actions only by passing messages.
- Issues in DS
 - Concurrency
 - No Global Clock
 - Independent Failures



Distributed Systems Issues

- **Concurrency**

- Concurrent program execution is the norm
- Coordination of concurrently executing programs that share resources is must.

- **No global clock**

- Co-ordination depends on time at which programs' action occur.
- Limits to the accuracy with which the computers in a network can synchronize their clocks.
- There is no single global notion of correct time.



Distributed Systems Issues

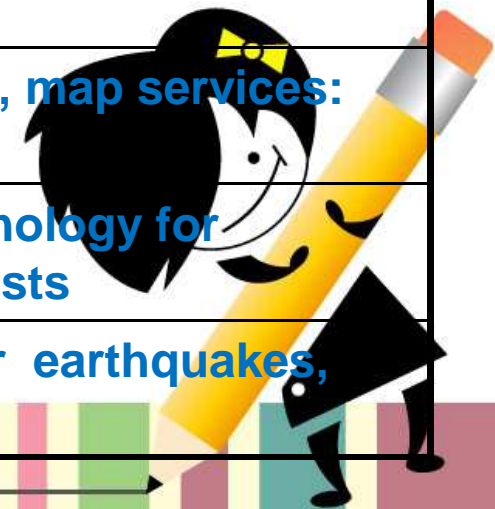
- **Independent Failures**

- Faults in the network result in the isolation of the computers (will not stop running)
- failure of a computer, or the unexpected termination of a program somewhere in the system (a crash), is not immediately made known to the other components with which it communicates.



Applications of DS

<i>Finance and commerce</i>	eCommerce e.g. Amazon and eBay, PayPal, online banking and trading
<i>The information society</i>	Web information and search engines, ebooks, Wikipedia; social networking: Facebook and MySpace.
<i>Creative industries and entertainment</i>	online gaming, music and film in the home, user-generated content, e.g. YouTube, Flickr
<i>Healthcare</i>	health informatics, on online patient records, remote monitoring of patients
<i>Education</i>	e-learning, virtual learning environments; distance learning
<i>Transport and logistics</i>	GPS in route finding systems, map services: Google Maps, Google Earth
<i>Science</i>	The Grid as an enabling technology for collaboration between scientists
<i>Environmental management</i>	sensor technology to monitor earthquakes, floods or tsunamis



Examples of Distributed Systems

Web Search

- Task of a web search engine is to index the entire contents of the World Wide Web.
- Web consists of over 63 billion pages and one trillion unique web addresses.
- Google web search engine consists of the following.
 - physical infrastructure
 - distributed file system
 - distributed storage system
 - distributed locking and agreement;
 - programming model (parallel and Distributed computing)



Examples of Distributed Systems

Massively multiplayer online games (MMOGs)

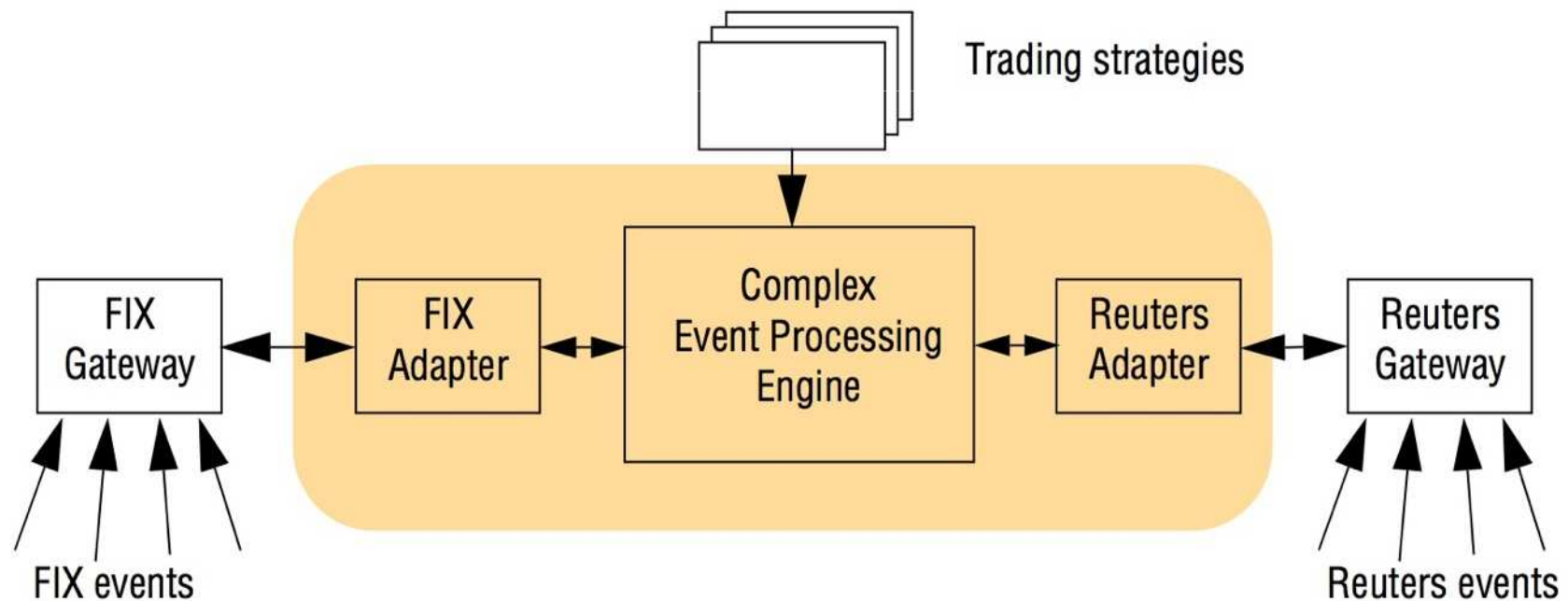
- Sony's EverQuest II and EVE Online from the Finnish company CCP Games
- fast response times
- real-time propagation of events to many players and maintaining a consistent view of the shared world.
- **EVE** Online, utilizes a **client-server** Architecture
- **EverQuest** adopts **Distributed** systems architecture
- **Researchers** look for **peer- to - peer** technology.
every participant contributes resources
(storage and processing) to accommodate the game.



Examples of Distributed Systems

Financial trading

- communication and processing of items of interest, known as events in distributed systems.





Focus on resource sharing

- Sharing data in the form of a shared database or a set of web pages.
- **Computer-supported cooperative working (CSCW)**
 - A group of users who cooperate directly share resources such as documents in a small, closed group.
- **Service** : Manages a collection of related resources and presents their functionality to users and applications
(File service - read, write, delete - operations on files)



Focus on resource sharing

- **Server:** A running program (a process) on a networked computer that accepts requests from programs running on other computers to perform a service
 - **Client – Server**
 - **Client (active- making request)**
 - **Server (Passive – Process request)**
- **Remote Invocation**
- **Distributed system written in OO- language**
 - **Client object invoking a method upon server object.**





Summary

- Introduction
- Examples of Distributed Systems
- Focus on resource sharing



THANK YOU

