

Chapter 1

Characterization of DS



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Outline Today

Chapter 1 – Characterization of DS

- ❖ Definition of DS
- ❖ Example of DS
- ❖ Trends in DS
- ❖ Focus in Resource Sharing
- ❖ Challenges

Definition

A distributed system is one in which hardware or software components located at networked computers communicate and coordinate their actions only by passing messages. [COU'12]

A distributed system is a collection of independent computers that appears to its users as a single coherent system. [TAN'07]

A distributed system is a system consisting of a collection of autonomous machines connected by communication networks and equipped with software systems designed to produce an integrated and consistent computing environment. [JIA'05]

Characteristics of DS

- Concurrency
 - concurrent programs execution – share resource
- No global clock
 - programs coordinate actions by exchanging messages
- Independent failures
 - when some systems fail, others may not know

Examples 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, monitoring 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

Trends in DS

Distributed systems are undergoing a period of significant change

- ✓ the emergence of pervasive networking technology; **WiMAX**
- ✓ the emergence of ubiquitous computing coupled with the desire to support user mobility in distributed systems; **Smart City**
- ✓ the increasing demand for multimedia services; **Skype**
- ✓ the view of distributed systems as a utility. **Data Centres / Google**

Resource Sharing

- ✓ Is the primary motivation of distributed computing
- ✓ Resources types
 - a) **Hardware**, e.g. printer, scanner, camera
 - b) **Data**, e.g. file, database, web page
 - c) **More specific functionality**, e.g. search engine, file

Challenges

- 1) Heterogeneity : variety and difference
- 2) Openness : be extended and reimplemented
- 3) Security : CIA
- 4) Scalability : significant increase
- 5) Failure handling : techniques for dealing
- 6) Concurrency : represents a shared resource
- 7) Transparency : concealment
- 8) Quality of Service : to provide guarantees

References

- [COU'12] Coulouris, G. Dollimore, J., Kindberg, T., Blair, G., DISTRIBUTED SYSTEMS :Concepts and Design Fifth Edition, Pearson Education, Inc., United States of America, 2012.
- [TAN'07] Tanenbaum, A.S., Steen, M.V., DISTRIBUTED SYSTEMS : Principles and Paradigms Second Edition, Pearson Education, Inc., United States of America, 2007.
- [JIA'05] Jia. W., and Zhou. W., DISTRIBUTED NETWORK SYSTEMS : From Concepts to Implementations, Springer Science , Inc., 2005.

Thank You



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