DS Summary

**Defining Distributed Systems**

* “A system in which hardware or software components located at networked computers communicate and coordinate their actions only by message passing.” [Coulouris]
* “A distributed system is a collection of independent computers that appear to the users of the system as a single computer.” [Tanenbaum]

**Computer Networks vs. Distributed Systems**

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| Networks:  A media for interconnecting local and wide area computers and exchange messages based on protocols. Network entities are visible and they are explicitly addressed (IP address). | Distributed System:  existence of multiple autonomous computers is transparent |

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| However,  many problems (e.g., openness, reliability) in common, but at different levels.   * Networks focus on packets, routing, etc., whereas distributed systems focus on applications. * Every distributed system relies on services provided by a computer network. |

**Reasons for having Distributed Systems**

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| Functional Separation | Inherent distribution | Power imbalance and load variation | Reliability | Economies |
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**Characteristics of Distributed Systems**

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Distributed Systems Archtectures

Socket Programming

RPC/RMI

Asynchronous Communication

Distributed Component Frameworks

Open Message Formats

SOA and WS

Service Integration, Orchestration and Security

Introduction to Cloud computing

Microservices

Fault Tolerance

Clock Synchronization