

Distributed Computing I

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THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

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Software Architecture

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1 Introduction

2 Reliable Software

2.1 Fault Tolerance

2.2 Distributing Risk

3 Distributed Architecture

4 Fallacies of Distributed Computing

4.1 The Network is Reliable

4.2 Latency is Zero

4.3 Bandwidth is Infinite

4.4 The Network is Secure

4.5 The Topology Never Changes

4.6 There is Only One Administrator

4.7 Transport Cost is Zero

4.8 The Network is Homogeneous

5 Auto-scaling

6 Why distribute?

Distributed Computing II

Software Architecture

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1 Scalable Software

1.1 Scaling Up

1.2 Scaling Out

2 Load Balancing

3 Replication

3.1 Leaders and Followers

3.2 Multi-leader Replication

3.2.1 Conflict Resolution

3.3 Leaderless

4 Partitioning/Sharding

4.1 Partition by Primary Key

4.2 Partition by Secondary Index

4.3 Re-balancing

5 Transactions

They exist? ACID

6 Consensus

6.1 Behaving Nodes

Leaders Lock

6.2 Byzantine Faults

Byzantine Generals Problem

7 Consistency

7.1 Eventual Consistency

7.2 Linearizability

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