FIT5183
Programming for Distributed, Parallel and Mobile Systems

Week 1 – Introduction

Lecturer
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Lecturer's details

- Dr. Jue (Grace) Xie
- Contact Details
  - Jue.Xie@monash.edu
- Consultation
  - Tuesday, 4pm-6pm
  - Venue: 7205

Lecture overview

- This Unit
  - Unit guide and timetable
  - Scope of the unit
- This Lecture
  - Distributed systems background
  - Introduction to Threads
    - Java Threads
    - Concurrency
    - Examples

Timetable

Activity	Day	Time	Location
Lecture	Tuesday	9-11am	8214
Tutorial/Laboratory one (T1)	Tuesday	1-3pm	7202
Tutorial/Laboratory two (T2)	Tuesday	3-5pm	7201
Consultation	Tuesday	4-6pm	7205

Learning objectives

- Look at different patterns for distributed systems
- Look at additional issues for distributed systems *versus* stand-alone systems
- To learn concepts, strategies, and design principles for distributed systems

Scope of the unit

- Using Java, cover the design and development aspects of distributed systems, including
  - Thread and Socket (W1,W2)
  - Protocol design (W3, W4)
  - Security (W5) – Assignment 1 due in week 5
  - HTTP, Java Servlets and JSPs (W6)
  - RPC and RMI (W7)
  - CORBA and Java EJBs (W8)
  - Web services (W9)
  - JMS and multiple middleware, Google case study (W10) - Assignment 2 due in week 10
  - Distributed mobile computing systems, and mobile development platforms (W11)
  - New trend in mobile programming (W12)

Week	Lecture	Tutorial
Week 1	Introduction, Concurrency and Threads	
Week 2	Architectural Models, Paradigms, TCP/IP and Sockets	
Week 3	Protocol Design	
Week 4	State Transactions, Half-Object Plus Protocol, Structured Data Formats	
Week 5	General Security, Java Security	**Assignment 1 due Friday 3 April 2014 23:55**
Week 6	HTTP, Java Servlets and JSPs	Assignment 1 Demos and Interviews
Week 7	RPC and RMI	Assignment 1 Demos and Interviews
Week 8	CORBA and Introduction to EJBs	
Semester Break (Labour's Day)		
Week 9	Web Services and Services Oriented Architecture	
Week 10	Java Message Service, Multiple Middleware, Google Case Study	**Assignment 2 due Friday 15 May 2014 23:55**
Week 11	Distributed Mobile Computing Systems, Mobile Development Platforms and Java for Android Development	Assignment 2 Demos and Interviews
Week 12	Lecture Revision and Exam Discussion	Assignment 2 Demos and Interviews

Assessment

- 50% Two Programming Assignments
  - 25% Due Friday 3 April 2014, Week 5, followed by demos and interviews in tutorials
  - 25% Due Friday 15 May 2014, Week 10, followed by demos and interviews in tutorials
- 50% Written Examination
  - In Week 14 (8-12 June 2015)

Software Package

Name	Test version	Latest version	Description	Weblink
Java JDK	7.67	8.31	Java SE Development Kit (including JRE) or Java EE 7 SDK	http://www.oracle.com/technetwork/java/javase/downloads/index.html http://www.oracle.com/technetwork/java/javaee/downloads/index.html
Eclipse IDE for Java EE	indigo	luna	IDE for Java EE developers	http://www.eclipse.org/downloads/
Apache Tomcat	6.0	8.0.17	Web server and java Servlet/JSP container	http://tomcat.apache.org/
MySQL Community Server and Workbench	5.2	5.6 & 6.2	Database	http://dev.mysql.com/downloads/
Sublime Text	3 (beta)	3 (beta)	Text editor for coding	http://www.sublimetext.com/3

Today's Lecture

- Part I - Introduction to distributed systems (concepts, design issues & challenges)

- Part II - Concurrency and Threads

Part I

Introduction to Distributed Systems

Distributed Systems

- What are distributed systems?

  There are many definitions, e.g.

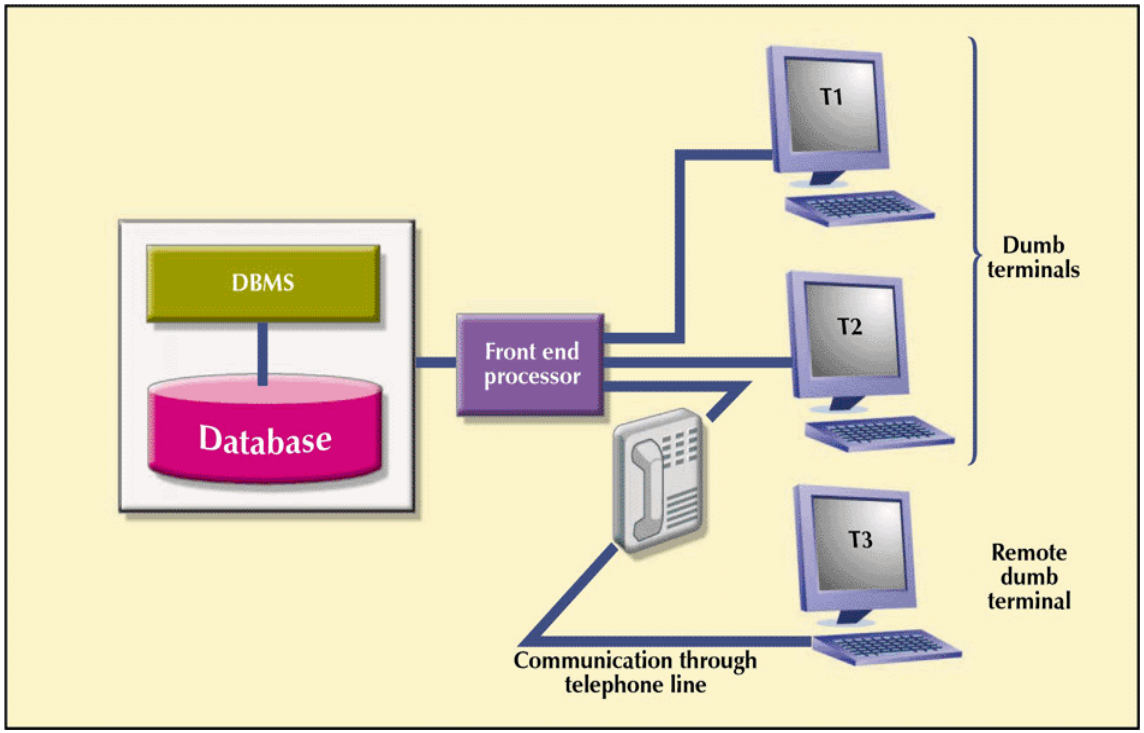
  – A number of computers or computing nodes that are linked by a network and that share data, processing or both (Dewire 1994)

  – A system that runs on a collection of machines that do not have shared memory, yet looks to its users like a single computer (Coronel et al. 2011)

  – One in which components located at networked computers communicate and coordinate their actions only by passing messages. (Coulouris et al. 2012)

What is a True Distributed System

FIGURE 10.6 SINGLE-SITE PROCESSING, SINGLE-SITE DATA (CENTRALIZED)



Coronel, Morris & Rob (2011) Chapter 12: Database Systems Design, Implementation, and Management

Early distributed systems (1945-1980s):

- Dumb terminals
- Mainframes and minicomputers
- Limited distribution
- From mid 1980s, emergence of LAN and WAN
- Java language was introduced in 1995

A Distributed System

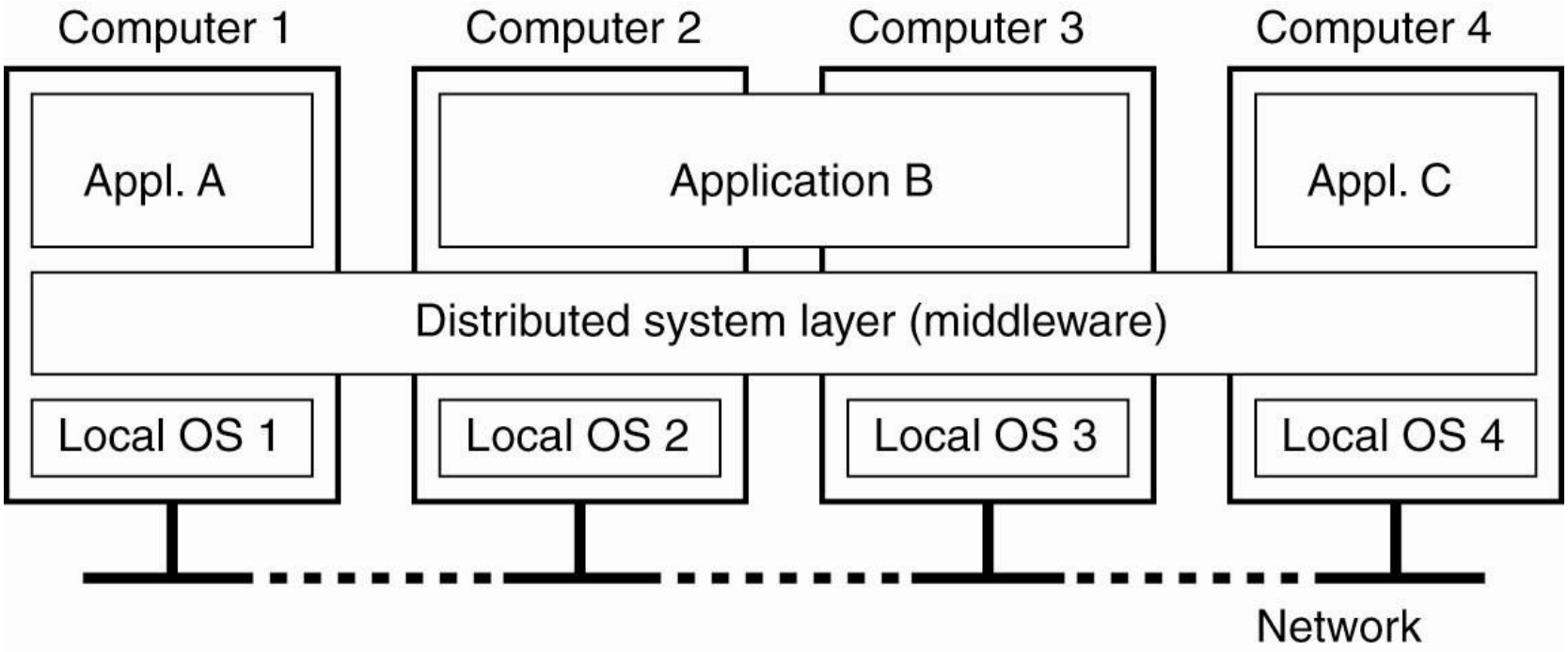


Figure 1-1. A distributed system organised as middleware. The middleware layer extends over multiple machines, and offers each application the same interface. (Tanenbaum & Van 2007)

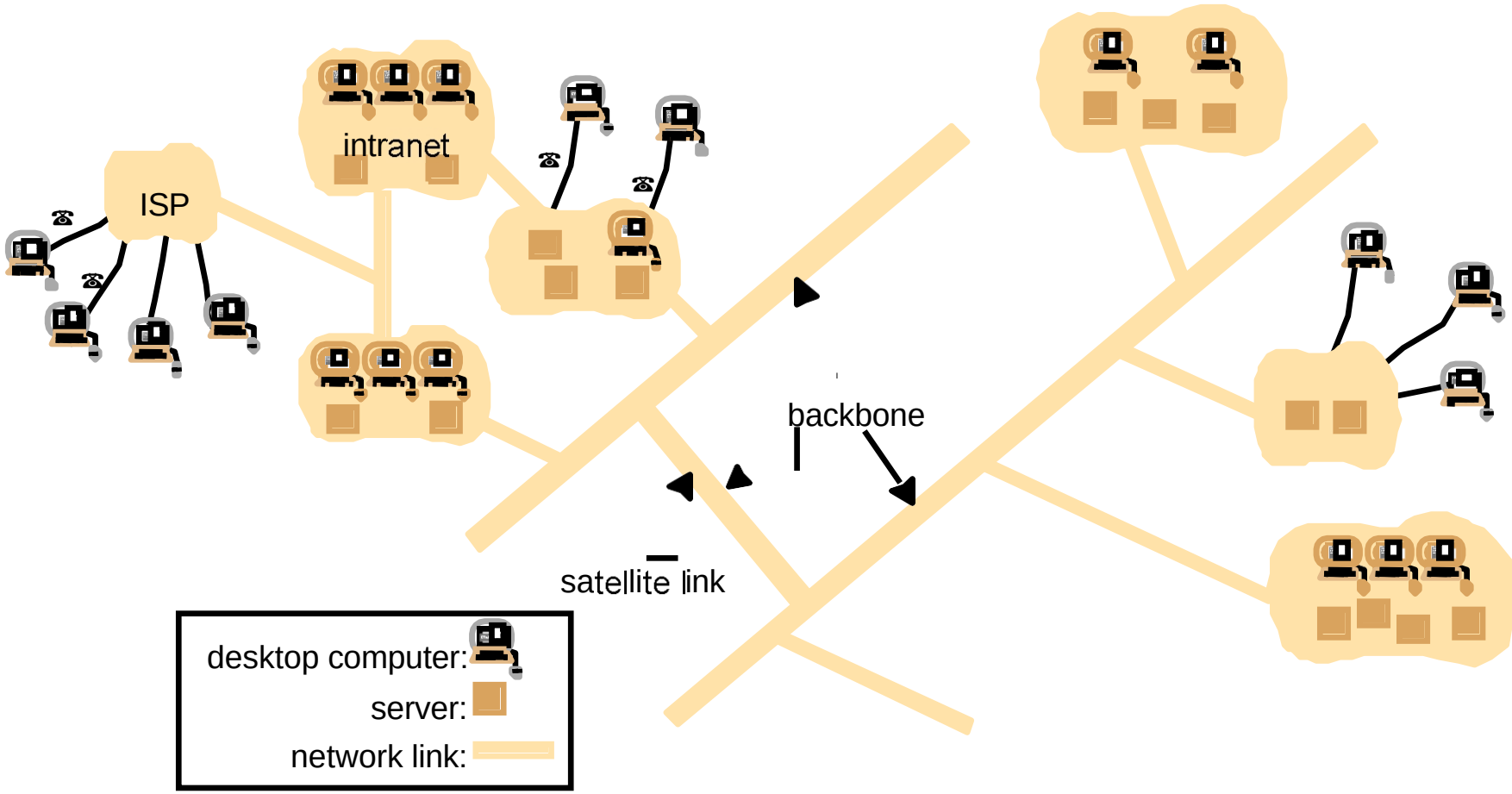
Examples of Distributed Systems

- Web search,
- Online banking and trading systems,
- E-Commerce, e.g. Amazon, eBay, PayPal, Taobao,
- Social networks, e.g. Facebook, Twitter Tecent Wechat
- Online gaming etc.

Computing Models

- A natural evolution, and combination, of different computing models:
  - High-level communication of applications through **Web Services**
  - **Utility computing** for packaging computing and storage resources as services (cloud computing)
  - **Computing Cluster** that combines a collection of computers such that they appear as one large computer (using **cluster** and **virtualization** technologies to manage lots of computing and storage resources)
  - **Grid computing** to deal with distributed resources over the network

A typical portion of the Internet



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