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Title: Distributed_Applications (16.04.2012)

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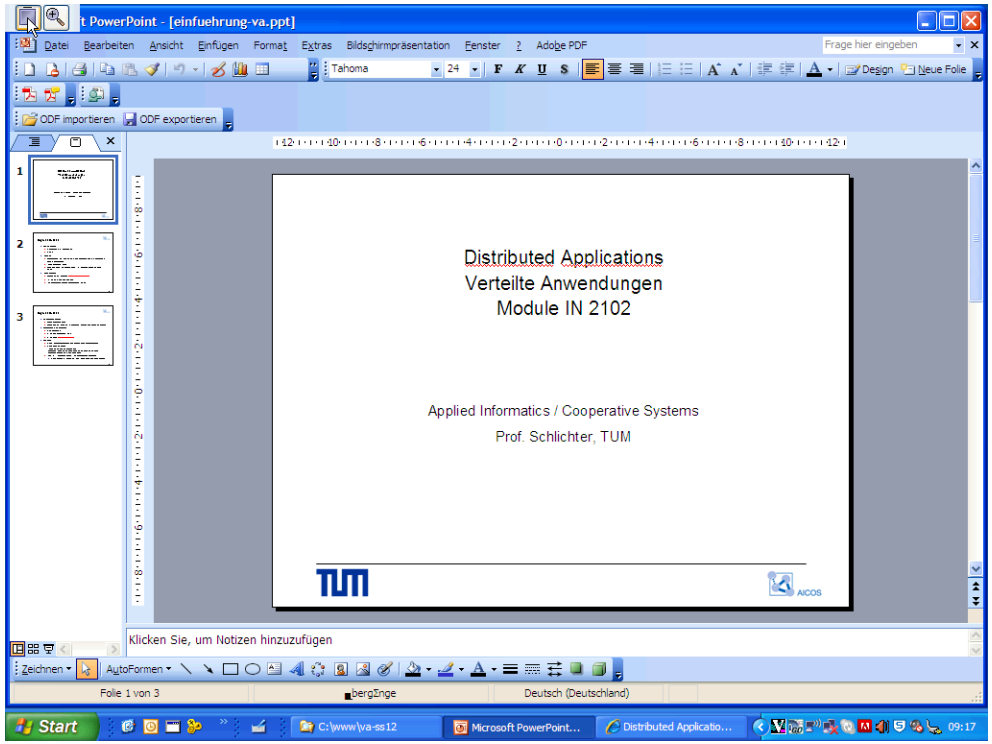


Distributed Applications
Verteilte Anwendungen
Module IN 2102

Applied Informatics / Cooperative Systems

Prof. Schlichter, TUM

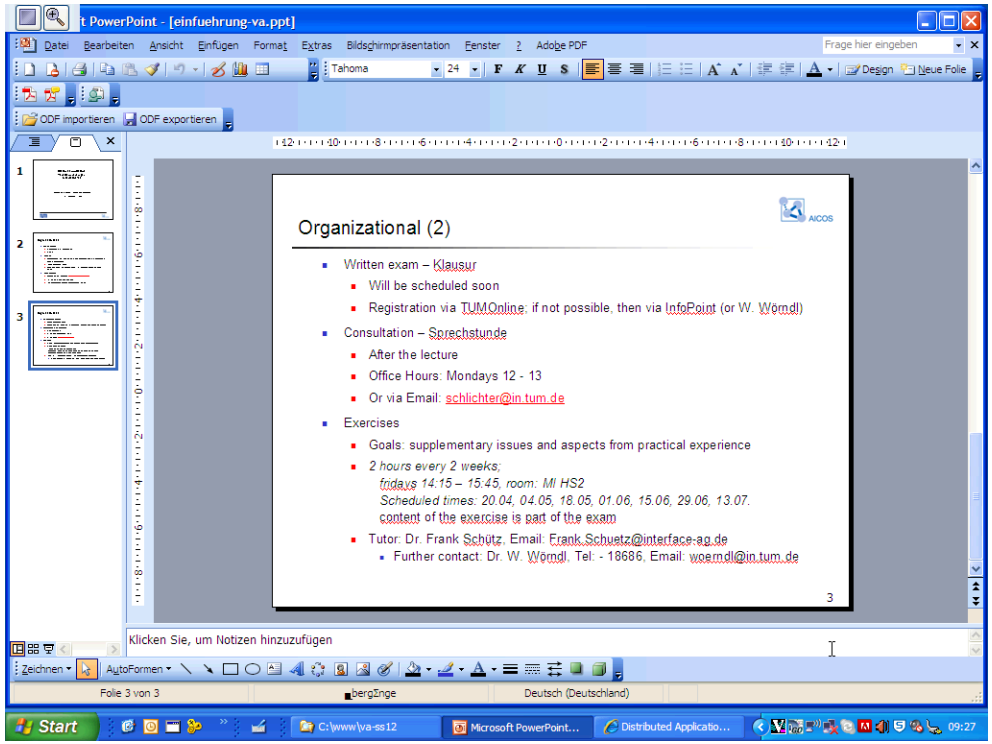
AICOS

Organizational (1)

- Course Volume
  - 3 SWS lecture + 1 SWS exercise
  - 5 ECTS
- Lectures
  - Mondays (09:15 – 10:00, MI HS 2) and Tuesdays (14:30 – 16:00, Interim 2; lecture hall change!!)
  - Lecture language: English
  - Recording using TeleTeachingTool (TTT), recordings available via video server
- Lecture material
  - Available on our Web Site: http://www11.in.tum.de/lehre
  - PDF script for print and online use
  - Few modifications compared to material of SS 2011

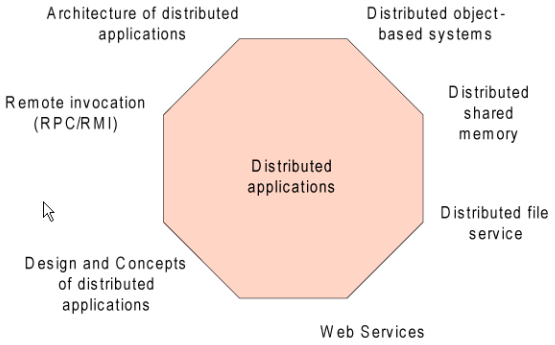
Organizational (2)

- Written exam – Klausur
  - Will be scheduled soon
  - Registration via TUMOnline; if not possible, then via InfoPoint (or W. Wörndl)
- Consultation – Sprechstunde
  - After the lecture
  - Office Hours: Mondays 12 - 13
  - Or via Email: schlichter@in.tum.de
- Exercises
  - Goals: supplementary issues and aspects from practical experience
  - *2 hours every 2 weeks;*
    fridays 14:15 – 15:45, room: MI HS2
    Scheduled times: 20.04, 04.05, 18.05, 01.06, 15.06, 29.06, 13.07.
    content of the exercise is part of the exam
  - Tutor: Dr. Frank Schütz, Email: Frank.Schuetz@interface-ag.de
    - Further contact: Dr. W. Wörndl, Tel: - 18686, Email: woerndl@in.tum.de



Overview

introduction of basic concepts for the design and implementation of distributed applications.



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Lecture Content

Discussion of various aspects, concepts and mechanisms of distributed applications.

Basic principles for the design of distributed applications.

Terminology, communication mechanisms, client-server model, aspects of remote invocation (RPC, RMI).

model for distributed applications.

happend-before relation, clocks for synchronization

Introduction to distributed transactions and group communication.

2 phase commit, aspects of consistent message delivery ("atomic multicast", virtual synchronization) in groups, group management.

Information replication and distributed file systems.

consistency of replicated information, concurrency control.

Designing distributed applications.

Web services

MDA (Model Driven Architecture)

SOA modeling

Object-oriented distributed systems.

Impact of the object-oriented paradigm on design of distributed applications, especially Corba.

Secure communication in distributed systems.

The following literature was used to prepare this lecture.

Course Text Books

George F. Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design", Addison-Wesley, 2007 (2001)

see also Web Site for references and additional information

George F. Coulouris, Jean Dollimore, Tim Kindberg, "Verteilte Systeme: Konzepte und Design", Pearson Studium, 2005 (German)

Andrew S. Tanenbaum, Maarten van Steen, "Distributed Systems - Principles and Paradigms", Prentice Hall, 2007

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Further Reading

S. Allamaraju et al., "Professional Java Server Programming - J2EE Edition", Wrox Press, 2000

G. Alonso, F. Casati, H. Kuno and V. Machiraju, "Web services: concepts, architectures and applications", Springer-Verlag, , 2004.

D.K. Barry "Web services and service-oriented architectures", Morgan-Kaufmann, 2003.

M. Bell, "Service-Oriented Modeling", John Wiley&Sons, 2008

K. Birman, "Reliable Distributed Systems", Springer, 2005

M. Liu, "Distributed Computing - Principles and Applications", Pearson Addison-Wesley, 2004

G. Glass, "Web services: building blocks for distributed systems", Prentice-Hall, 2002.

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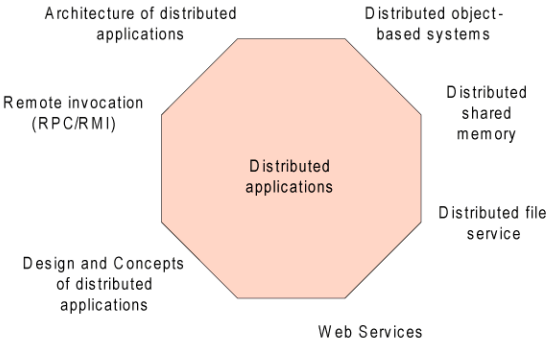
S. Graham, D. Davis, S. Simeonow, G. Daniels, P. Brittenham, Y. Nakamuar, P. Fremantle, D. König and C. Zentner "Building web services with Java", Sams Publishing, 2005.

API	Application Programming Interface
BPEL4WS	Business Process Execution Language for Web Services
B2B	Business-to-Business
B2C	Business-to-Consumer
CLSID	class identifier (in the context of DCOM)
CORBA	Common Object Request Broker Architecture
CSCW	Computer Supported Cooperative Work
DCE	Distributed Computing Environment (OSF)
DCOM	Distributed Component Object Model
DIT	Directory Information Tree (LDAP)
DME	Distributed Management Environment (OSF)
DNS	Domain Naming Service
DSM	Distributed Shared Memory
EAR	Enterprise Archive
EJB	Enterprise Java Beans
GIOP	General Inter-ORB Protocol
IDL	Intreface Definition Language
IETF	Internet Engineering Task Force
IID	Interface Identifier (in the context of DCOM)

Overview

introduction of basic concepts for the design and implementation of distributed applications.



Introduction

Issues

Issues of the following section

Motivation for distributed systems and distributed applications.

Basic terminology for distributed systems, e.g. terms like ***distributed applications*** , and ***interface*** .

Introduction to some influential historic distributed systems, such as NFS File system, Mach and Java 2 Platform Enterprise Edition.

1950	specialized applications (reserved computing time)	isolated data
1960	numerical applications (batch)	
1970	commercial applications (Time Sharing)	data modeling
1980	presentation -oriented applications (personal workstation)	isolated data , desktop publishing
1990	distributed application	distributed information management Multimedia
2000	internet computing	Web Services service oriented architecture (SOA)

Networks of heterogeneous computers, applications using shared resources which are geographically dispersed, information communication (i.e. improved information flow), and activity coordination.

Examples:

- online flight-reservation
- distributed money machines
- audio/video conferencing applications, e.g. Microsoft Netmeeting (see the application domain "Computer-supported Cooperative Work"), Internet telephony (e.g. Skype)
- World Wide Web
- Grid Computing

  use the resources of many separate computers connected by a network to solve large-scale computation problems, e.g. SETI@home : Search for Extraterrestrial Intelligence.

- Social Software

  sharing of private information and collaborative tagging, e.g. Blogs, Flickr, YouTube, Twitter, Facebook