**Presentation Overview**

- NICTA – Australian Centre of ICT Excellence
- Quick overview of the Business Adaptation and Interoperation (BAI) project
- Some of our work on cloud computing challenges
- Possibilities for Ph.D. studies
- Questions and discussion

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**About NICTA (www.nicta.com.au)**

- Centre of Excellence information & communication technologies (ICT) research institute
- Use-inspired research, collaboration with industry, research commercialisation
- Established in 2002, now 5 labs in 4 cities
- Over 400 research staff and 300 postgraduate research students
- NICTA members, partners, funding sources:

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**Recent NICTA Re-organisation**

- 6 research groups (~ 100 people each)
  - Software Systems
  - Networks
  - Machine Learning
  - Computer Vision
  - Control and Signal Processing
  - Optimisation
- 4 business teams (orthogonal to research groups)
  - Broadband and the Digital Economy
  - Health
  - Infrastructure, Transport, and Logistics
  - Safety and Security

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**Our Team’s Project: Business Adaptation and Interoperation**

- Advanced software technologies for fluid and adaptive business-to-business inter-operation
  - Determining scope, size, and cost of developing service-oriented and cloud systems
  - Performance analysis of service-oriented and cloud systems
  - Run-time monitoring and adaptation frameworks
  - Adaptation that maximizes business value
  - Fluid and flexible inter-operation extending resource-oriented architecture principles
  - Vocabulary management with ontologies

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**Project’s Application Areas**

- Business processes implemented with service-oriented and resource-oriented architectures
  - History of successful collaboration with Australian government departments and industry consortia
  - Patent applications (submitted or in preparation)
- Hybrid cloud computing systems
  - We study and use Microsoft Azure, Google App Engine, and Amazon cloud offerings
  - We seek additional industry & research partners
Provisioning of computing:
- infrastructure (e.g., memory storage, CPU cycles),
- platforms (e.g., virtualized Linux desktops), or
- software applications (e.g., customer relationship management suites)

over the Internet, as a utility/service that can be bought on demand

IaaS, PaaS, SaaS (and other) clouds
Public, private, hybrid, and community clouds
A lot of hype & exaggeration, but also many open research problems in cloud operation and use

Our Adaptive Cloud Technologies (ACT)

Adaptation Example: Cloudburst

Example: Managing Disaster Recovery

Determining Cloud Costs & Performance

Possibilities for Ph.D. Studies

• Costs of migrating legacy applications to cloud
  - NICTA’s comprehensive effort estimation model
• Costs of using cloud services
  - Problem: Huge variety of cloud offerings and their prices change dynamically
  - NICTA’s Cost Estimation Tool estimates monthly costs of using major public clouds based on app architecture, average resource consumption, and workload patterns
• Performance of complex service/cloud systems
  - NICTA’s proven ePASA performance analysis tool
  - Using this information for adaptation decisions
    - Cost & speed of: a) doing changes, b) resulting system

• For standard application stacks, automatically build a backup site in cloud and keep in sync
  - Given application architecture/implementation, suggest the best disaster recovery solutions

• Our Ph.D. students officially study at the Uni. of New South Wales or Uni. of Sydney
• There are several scholarships/assistantships and many students hold 2-3 of them
• The universities (not NICTA supervisors!) make all acceptance and scholarship decisions
• Realistic scholarship chance for international students: GPA over 90% (85% for domestic) and some research papers
• Australia has family-friendly student visas
Conclusions

- NICTA is Australian Centre of ICT Excellence that conducts world-leading research in many areas, including enterprise software systems.

- The recent focus of the BAI project is determining and managing cloud usage cost and performance:
  - Example: making optimal adaptation decisions
  - We also conduct research in several other aspects of enterprise software systems.

- In collaboration with Uni. of New South Wales and Uni. of Sydney, we have Ph.D. study opportunities for very strong candidates.

Questions?
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