Zero Downtime for Multi Tenant SaaS Systems

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ABSTRACT
This keynote presentation addresses the challenges of the software industry for developing multi-tenant systems as Software as a Service (SaaS), with respect to the requirement of zero downtime. Objective is to create awareness that this is not only a technical challenge but also a business challenge.

Categories and Subject Descriptors
H.4.0 [**Information Systems**]: Information Systems Applications, General

General Terms: Performance

EXACT SOFTWARE
Exact Software is a Dutch software development company with head office located in Delft, The Netherlands. Exact Software has more than forty subsidiaries in Europe, the Middle East, North & South America, Asia and Australia and provides global solutions to small and medium-sized businesses, and subsidiaries of multinationals. Exact employs over 2.500 employees worldwide serving customers in 120 countries.

Exact Research & Development focuses on the development of new business software solutions. Exact Research and Development centres are located throughout the world. Exact's main research centres is located in Delft, The Netherlands.

Since 2008 Exact has a strategic collaboration alliance with Delft University of Technology.

KEYNOTE SUMMARY
The software industry is changing due to technology developments, market developments as well as economic changes.

Business software systems today are mostly single tenant, on-premise and closed systems. Cost of ownership of these systems is fully borne by the business.

On-premise business systems have a maintenance window for backup, upgrades and migrations at night or during weekends. As long as downtime of these systems is within the maintenance window, business is not affected by it.

Trends in business are the 24/7 economy, internationalization, cost reduction and focus on core business activities.

Software as a Service
Software as a Service (SaaS) is becoming a more widely used business model for offering and delivering IT services and business applications. SaaS reduces the cost of ownership for the business by outsourcing software and infrastructure to service providers. Outsourcing also allows business to focus on their core business.

Service providers use virtualization technologies to offer desktops, including the client software, as a service. Internet technologies are used by service providers to offer web applications as client-server business applications.

Most services provided today are based on single-tenant systems. Although the service provider serves multiple tenants, each tenant has his own applications and databases to his disposal. Operational costs for these kinds of systems are still high.

Using multi-tenant systems to offer services is the next step in industry. Samples are ExactOnline.nl and, for instance, Salesforce.com. Multi tenant systems have the full benefit of economics of scale, by reducing costs of infrastructure, software and operations.

Zero Downtime for Multi Tenant Systems
Multi tenant systems in a service-oriented environment create new challenges for software designers and engineers with respect to maintenance and migrations.

Doing businesses in an international, 24/7 economy, means services must be accessible for its users any time during the day. Open system service architectures have increased dependencies between systems, requiring systems to be available all the time. Zero downtime for system maintenance and system migration, therefore, becomes an essential requirement.

Multi-tenant business systems contain enormous amounts of transactional data. Backup systems will cover possible outage of the main system, but database migrations and data model updates cannot be done without shutting down parts of the system. Using a separate environment for migration is too expensive from a cost point of view, and transferring a huge amount of data from one version of the system to a new version takes too much time.

More and more software is developed in smaller iterations, meaning system migration has to take place more frequently, putting more stress on the system maintenance and migration.

Challenges for the Industry
Multi-tenant SaaS systems are still being developed, maintained and migrated on concepts created for single-tenant on premise systems. New concepts and solutions are needed to be able to meet the challenges of zero downtime.

Can software integration and evolution at runtime be an answer to the challenge, and can they be done without threatening the operational integrity of the running system?

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