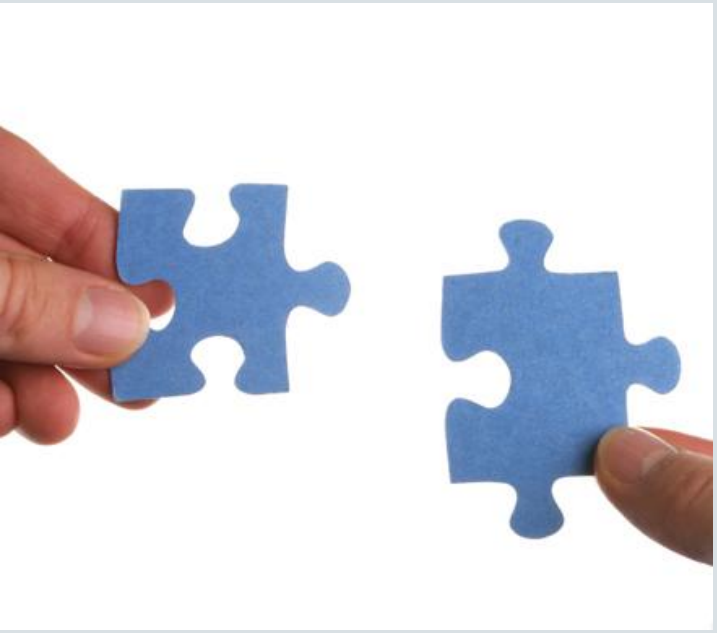

Cost-efficient SOA deployment architectures with Solaris Zones and ZFS

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Trygve Laugstøl, javaBin, Arktekk

Abstract

Today’s system development and service oriented systems add a new set of exciting and challenging requirements to the company infrastructure. Customer typically expect new versions in production every two weeks. To guarantee quality in these scenarios, we need to think different in how we scale and evolve the hardware infrastructure.

A Solaris x86 cluster with Zones and ZFS is a good foundation to reduce the cost and time-to-market for these new challenges. This talk will present our experiences with using virtualization with Zones and ZFS from several customer projects and present some ‘best practices’ for configuration and management of such infrastructures, including the development cycle, continuous integration and production routines.

Agenda

- Problem description
  - *Why the SOA makes this much much harder*
- A typical case/scenario
  - *Service oriented Arcitecture*
  - *SOA deployment moduler*
- Solaris Zones and ZFS intro
- Efficient deployment processes
- KPI / Business Case
- Alternatives
- Conclusions
- Q&A

Totto who?

- President, javaBin since 1998
- Organizer of JavaZone - the biggest developer conference in the Nordic region
- Sun Java Champion
- Advisory Board Member, java.net
- Sjefskonsulent Objectware
  - *Arkitect, developer, mentor*
  - *J2EE since 1997, J2SE/J2ME, AOP, Jini/JavaSpaces, UML, RUP, Agile*
  - *More than 30 years of developer experience*
- MSc from NTH/NTNU
- ... And a lot more... ☺

Problem description

- Today's SOA systems is different..
  - *From a small number of applications/systems (2-20)*
  - *To a large number of (SOA) services (100-600)*
- Most of the well-known problems still exists
  - *Retain evolvability*
  - *Dependencies*
  - *Versioning*
  - *Change and adapt to business requirements*
- But this time **'on speed..'**
  - *From 3-15 systems to 100-600 services*
  - *Core services (Domain repos) with a lifespan of 10-30 years (Core Services)*
  - *New and updated services several times a month*

En tjenesteorientert arkitektur

Behov for smidighet

H2A

Human to Application services
Ansattportal - CRM mobile - Kundebildet - Internett

A2A

Application to Application services
Kundevedlikehold - Bestilling

ACS

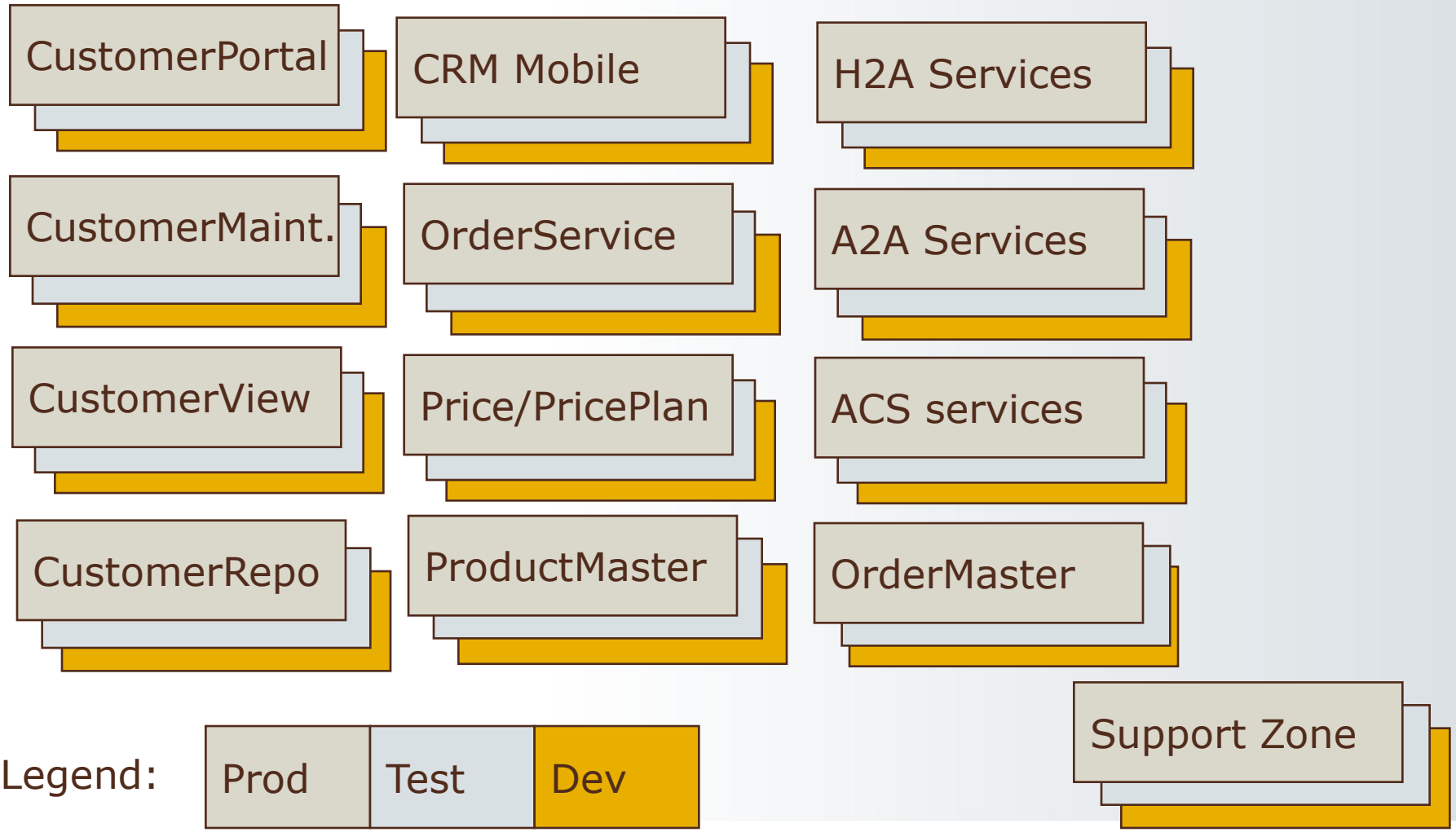
Aggregated Core services
Kundeoversikt

CS

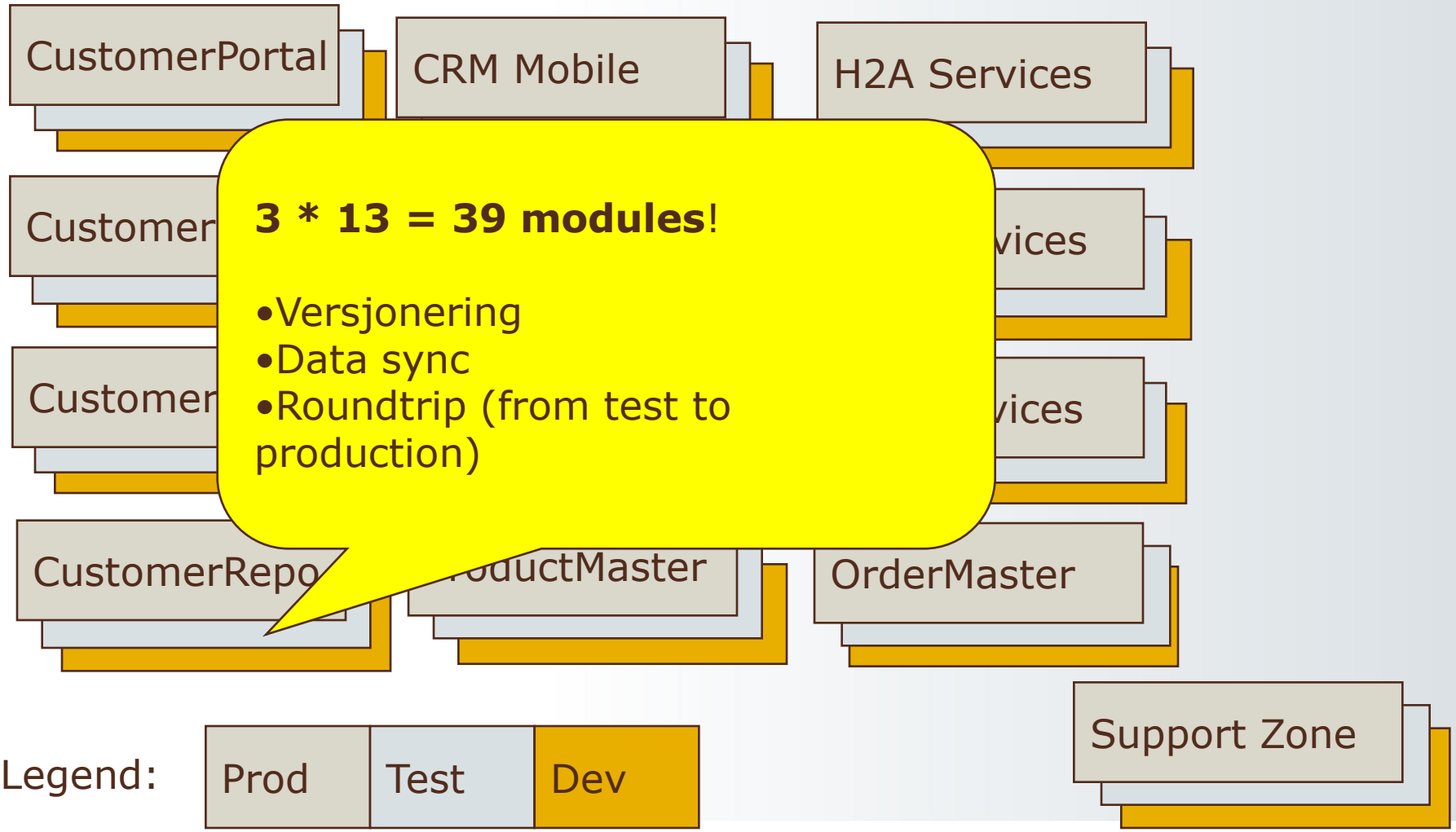
Core services
Kunde - Konfigurasjon - Dokumentasjon - Tjeneste - Leveranse - Ordre

Kostnad ved endring

Case deployment-moduler



Deployment modules



SOLARIS ZONES - INTRO

Zones - Intro

- Definition
- Cost
- Performance
- Resource management
- Administration

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Zones - Definition

A zone is a virtual operating system abstraction that provides a protected environment in which applications run

Zones

- Provides virtual machines
- Shared kernel
- Requires no special hardware
- Most applications run unmodified
- Easy to manage

ZONES - COST

Performance

- 40 zones, each running five copies of the Apache web service, on an E250 with two 300MHz CPUs, 512MB RAM, and three hard disk drives totalling 40GB. With all zones running and a load consisting of multiple simultaneous HTTP requests to each zone, the overhead of using zones was so small it wasn't measurable (<5%).

- Experience: virtually no overhead

Zones - Creation

- Fresh installation (sparse zone)

```
# zonecfg -z email-zone
zonecfg:email-zone> create
zonecfg:email-zone> set zonepath=/zones/email-zone
zonecfg:email-zone> set autoboot=true
zonecfg:email-zone> add net
zonecfg:email-zone:net> set address=10.0.0.1
zonecfg:email-zone:net> set physical=bge0
zonecfg:email-zone:net> end
Zonecfg:email-zone> ^D
```

Zones - Creation

- Clone an existing installation

```
zonecfg -z zone1 export | \
  sed -e 's/zone1/zone2/' | \
  zonecfg -z zone2
```

- zoneadm -z zone2 clone zone1

Zones - Installation

- Install

  zoneadm -z email-zone install
- Boot

  zoneadm -z email-zone boot
- Configure

  zlogin -C email-zone

Zones – Management Commands

```
# zoneadm boot
# zoneadm shutdown
# zoneadm halt
# zoneadm reboot
email-zone# shutdown 6
```

ZONES - RESOURCE MANAGEMENT

Zones - Resource Management

- Resource pools
- Processor sets
- CPU scheduler

Zones - Resource Management

- CPU
  - cpu-shares
  - capped-cpu
  - dedicated-cpu
- *Memory*
  - capped-memory
    - physical, swap, locked
  - max-shm-memory
  - max-shm-ids
  - max-msg-ids

Zones - Resource Management

- File system
  - Delegate ZFS data sets: dataset
  - lofs, raw
- *NICs*
  - ip-type
- *Other*
  - Privileges
  - max-lwps

ZFS

ZFS

- Pooled storage
- Hierarchical file systems
- Raid
- Always consistent on disk
- Snapshots & clone
- Compression & encryption
- Unlimited size(!)

ZFS - Pooled Storage

- Put all of your devices into a pool
- Create filesystems on top

TO BE COMPLETED...

Some numbers / KPI of the business value

- Reduced number of servers
  - *A mini-cluster with zones and ZFS will typically replace 3-6 times the number of servers, reducing cost with 50-70%*
- Reduced deployment roundtrip effort
  - *Typical reduction of effort in the deployment process are in the 70-95% ballpark due to virtualization, multi-version support and vertical separation*
- Increased quality in deployed artifacts
  - *Our experience indicate between two and five times the quality mostly due to the fast deployment process, multi-version support and vertical separation*

Alternatives

- OpenVZ for GNU/Linux
  - *Good virtualization support, very similar to Solaris Zones*
  - *Still a bit early*
- ZFS for GNU/Linux
  - *Not yet there with regards of performance yet (v.04)*

- Vmware/XEN
  - *Resource demanding (1.5-2x more than Zones/OpenVZ (memory, CPU, devices)*
  - *More heavy administration*

Conclusions

- Today's service-oriented architectures need better operationg-system support to handle the increased complexity in handeling the expanding number of services and the short release cycle
- The chellenges are well-known, but are now getting **critical** to the success of the company
- Virtualization with Solaris Zones and ZFS on mini-clusters is a good starting point
  - *But there are some pitfalls to be aware of...*

Q&A