Xen And the Art of OCaml

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Agenda

Xen and XenServer - Experiences - Statistics - Futures -
2002: Xen Project starts at SRG, University of Cambridge
2005: Xen 3.0 released, with open-source Python toolstack
2005: XenSource founded in Cambridge and Palo Alto
2006: Commercial XenServer distribution begins
2006: Hit and run on the SRG resulted in new FP hackers
2007: XenSource acquired by Citrix for $500 million
2008: Dell / HP ship embedded XenServer, supported by MS
Management Stack
Xend, XAPI

Control Domain
Hardware, management

Xen
Interrupts, CPU, memory

XenCenter GUI
Windows / C#

Web UIs
Javascript

Storage
VHD, iSCSI, Fibre Channel

OS Support
Windows PV, Linux Kernels
Language Use

- XenServer
  - OCaml
- XenServer
  - OCaml
- XenCenter
  - C#
- HP VMM
  - Java
- Powershell
Low-level Domains

- C bindings
- Makes Xen hypercalls
- Deals with domains
- Robust with (rigid) design patterns
- Crashes are hard to track down

Diagram:
- XenOps
- Control Domain
- Guest Domain
- Xen
XenAPI

Host CPUs
Host Metric
PIF Metric

PIF
Network
Host

Pool
Task
Event

PBD

SR

VDI

VBD

VM

VIF

VIF Metric

VM Metrics

Console

VBD Metrics
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Successes

Development Speed:
2 years: from nothing to enterprise tool-stack
Only one compiler bug

Hiring:
Easier to find talent!
Challenges

Supportability:
Memory usage tracing
Exception Handling
Tracing and Logging

Development:
Windows portability
IDE Integration
Code Statistics
Number of OCaml Contributors by Date

"Hiring" index
OCaml Lines changed by Date

“Maturity” Index
Lorenz curve of OCaml contributions vs contributors

“Equality” index
Futures

Low-Level:
- OCaml secure domains
- Xenstore, Melange
- OEM Embedded

High-Level:
- Declarative Data Centres
- SLA “compilers”
- F# / SCVMM integration?