How To Build A Better SRE

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Gaikai – Who we are

- Subsidiary of Sony
- Developed PS4 Remote Play
- Operates Playstation Now

• Disclaimer: This talk represents my own views
Agenda

- Introduction
- Toolbox
- Concepts
- Application Stacks
- Other Abilities
- Resources
- Q & A
What's an SRE?

- Availability, Scalability, and Security
- Managing Deployment and Changes
- Troubleshooting
- Influencing Architecture and Implementation
Related Jobs

- Sysadmin and Webadmin
  - Significant overlap of skills
  - Different focus
- Release / Integration Engineer
  - Builds, packaging, integration
- Software Engineer / Developer
  - DevOps ~ SRE?
Why SRE?

- Traditional 3-tier model may not be best fit
- For people who like challenges
- Cross-disciplinary exposure
- Role tends to reward excellence
Toolbox - Languages

- Languages
  - C / C++
  - Java
  - Python
  - Javascript, Ruby, etc.

- Fluency
  - Reading & Writing
  - Running & Debugging
Toolbox – Unix (1)

- **Commands**
  - ls, find, man
  - df, du
  - ping, traceroute, mtr
  - ssh
  - curl, wget
  - rpm, dpkg, ldd
  - svn, git

- **Scripting**
  - grep, cut, tr
  - awk, sed, jq
  - xargs
  - bash
  - cron
Toolbox – Unix (2)

- System Visibility
  - vmstat, iostat, dstat, top
  - netstat, lsof
  - strace, ltrace
  - tcpdump
- Many more

http://www.brendangregg.com/USEmethod/use-linux.html
Toolbox – Unix (3)

- Debuggers
  - gdb
  - jstack
  - pdb

- Profilers
  - oprofile
  - dtrace
  - ftrace
  - perf events
  - Poor Man's Profiler
Toolbox – Unix (4)

- Kernel
  - dmesg
  - modinfo, lsmod
  - modprobe, insmod

- Hardware
  - lspci
  - lshw
  - dmidecode
Toolbox – Network (1)

- Host Networking
  - ip vs. ifconfig
  - Static routing
  - iptables
    - Firewall & NAT
  - VIP failover
- Bonding
Toolbox – Network (2)

- OSI Stack
- TCP vs. UDP
- ICMP, PMTUD
- SCTP
- IPv6
Toolbox – Network (3)

- Application Protocols
  - HTTP(S)
  - SPDY, HTTP 2.0
  - DNS
  - NTP
  - DHCP
  - SNMP

- Routing Protocols
  - BGP
  - OSPF
  - MPLS
Toolbox – Network (4)

- Routers & Switches
  - Managed vs. Unmanaged
  - Cisco
  - Juniper

- Load Balancers
  - F5 Big-IP
  - Netscaler
  - Barracuda
Concepts – Operating Systems

- Scheduler
- Drivers
- User vs. Kernel space
- Virtualization
Concepts – Queueing Theory

- **Little's Law**
  - Load = Arrival Rate x Service Time

- **Universal Scalability Law (Gunther 1993)**
  
  http://www.perfdynamics.com/Manifesto/USLscalability.html
Concepts – Cloud Computing

• What is it?
• How is it different?
• Difference of scale
• Cloud vs. Enterprise
Concepts – Distributed Systems (1)

• Fallacies
• Not just theoretical
• Murphy's Law (De Morgan 1866?)
Concepts – Distributed Systems (2)

- Network is not reliable
  - Two General's Problem (Akkoyunlu, Ekanadham, Huber 1975)
- Network is not secure
  - Byzantine Generals' problem (Pease, Shostak, Lamport 1980)
- CAP principle (Brewer 1999)
Application Stacks (1)

- Apache, nginx
- MySQL / MariaDB, PostgreSQL
- Hadoop, HBase
- Zookeeper
- ElasticSearch, Logstash, Kibana
- Kafka, RabbitMQ
Other Abilities & Traits (1)

- Communication
  - Concise writing
  - Ability to avoid flame wars
  - Interviewing
- Troubleshooting
  - USE Method
  - Scientific Method
  - How To Solve It (Polya)
Other Abilities & Traits (2)

- **Dispatching**
  - Ability to identify the party with the domain expertise to solve problem
- **Ownership**
  - Ability to see problem through from end to end
- **Statistics**
  - Ability to use numbers to make your case
Additional Resources (1)

- High Scalability
  http://highscalability.com
- Jepsen articles
  https://aphyr.com/tags/jepsen
- Brendan Gregg's blog
  http://www.brendangregg.com
- ServerFault
  http://serverfault.com
Additional Resources (2)

• Conferences
  – SCaLE
  – Surge
  – Velocity
  – USENIX (LISA, SREcon)

• Academic papers
  – arxiv.org
  – IEEE ACM
Anybody can be an SRE!? 

- Not everyone should be an SRE, but good SREs can come from anywhere. 
- Diversity of talent, breadth and depth of knowledge is key to solving problems of unanticipated nature.
Thank You!

- Questions?
- Swag