How To Build A Better SRE

Rae Yip
Sony Gaikai
SCaLE 13x

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
  - http://en.wikipedia.org/wiki/Fallacies_of_distributed_computing
- Not just theoretical
  - https://aphyr.com/posts/288-the-network-is-reliable
- 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