



Site Reliability Engineering

Ryan Casey



Background

Education

Pittsburgh Technical Institute

2002 – Associates – Computer Systems Specialist

Robert Morris University

2011 – BS Information Systems - Web Development

2011 – MS Information Systems - Project
Management

Work History

Management Science Associates

2002 – 2003: Help Desk

2003 – 2010: Linux Administrator

SEI@CMU

2010 – 2013: Linux Administrator

2013 – 2015: Infrastructure Engineer

Uber Advanced Technologies Center

2015 – 2016: Site Reliability Engineer

SEI@CMU

2016 – 2022: Cyber Security Exercise Developer

Sheetz Inc

2022 – Present: Senior Site Reliability Engineer

What is a Service?

- Piece of software that provides functionality
 - Authentication
 - Identity
 - Logging
 - Storage
- Can run independently or require other services to operate

Monolithic App vs Microservices App

- Structure of how an application is architecture
- Monolithic
 - All-in-one system
 - Scales vertically
 - Tight coupling of software dependencies
- Microservices
 - Singular focus on service functionality
 - Scales horizontally
 - Loose coupling of software dependencies

What is Site Reliability Engineering (SRE)

- Originated as a role at Google
 - Published a book called “Site Reliability Engineering”
- Focused on production services
 - Sits at the end of Software Development Life Cycle (SDLC)
 - Goal is to ensure reliability
- Data driven discipline
 - Service Level Objectives (SLO)
 - Service Level Indicators (SLI)
- Works to eliminate toil

What about DevOps?

- DevOps and SRE work hand-in-hand
- DevOps main responsibilities:
 - Work to met developer's needs
 - Release management
 - Testing unreleased code (unit, integration, security, load)
 - Maintain pipelines
 - Packaging the final product
- SRE take over responsibilities once code is released

Platform Engineering: Future of SRE?

- Relatively new role focused on software deployments
- Similar to SRE:
 - Works to eliminate toil
 - Ensure a smooth transition of code from DevOps onto platform for deployment
 - Optimizes software delivery times into production
 - Improve efficiency of software pipelines

Attributes of an SRE

- Strong skills in either software engineering or system engineering
 - Must be willing to fill gaps on whichever skills is weaker
- Deep understanding of software systems
 - Operating system internals (system calls, performance tracing)
 - Networking (DNS, TLS, addressing latency)
 - Distributed systems
- Keen understanding of monitoring
- Affinity for eliminating toil

Service Level Objectives (SLO)

- Driving force behind SRE efforts
- Centered around services, not hosts
- Measurable attributes of services
 - The login service must obtain 99.95% availability
 - 85% of web servers request respond within 5ms
- Error budgets are provided for each service on a time basis
 - Can be on a daily/weekly/monthly basis
 - If exceeded deployments may cease to improve reliability
 - Roll back to stable releases

Service Level Indicators (SLI)

- Building blocks for SLOs
- Quality measurements of services
 - Availability
 - End-to-end throughput
 - Latency
 - Error rates
- Gathered from the service a whole
 - Does not focus on a single server/device
 - Can help find issues within your application



SRE Case Study: Sheetz Background

- Quick Service Retailer headquartered in Altoona, PA
- Family owned and operated since 1952
- Spread across six states: Pennsylvania, Maryland, West Virginia, Virginia, Ohio, and North Carolina
- Around 670 stores and over 24,000 employees
- Approx. 2 years ago migrated from a monolith to a “distributed monolith” microservices system
 - Move towards scaling and leveraging DevOps practices
- Always looking to innovate and be customer forward with change



SRE Case Study: Sheetz SRE

- New discipline at Sheetz
- Four main lines of effort:
 - Make systems harder to break
 - Make systems easier to fix
 - Increase total cost of ownership
 - Eliminate toil through automation
- Where to start?

SRE Case Study: Consumer Digital Platform

- Area of focus for initial SRE efforts at Sheetz
- Identified several “Value Streams” to improve:
 - Website
 - Online ordering
 - Mobile pay
 - Delivery services
 - Loyalty program
- Leveraging value stream to form SLO
 - Measured on a monthly basis

SRE Case Study: Future Work Plans

- Improve monitoring and alerting
 - Better fidelity
 - Send alerts to correct team
 - Resolve problems before they become customer facing
- Create run-books to better manage outages
- Better reflect cost of outage and overall impact



Questions?

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