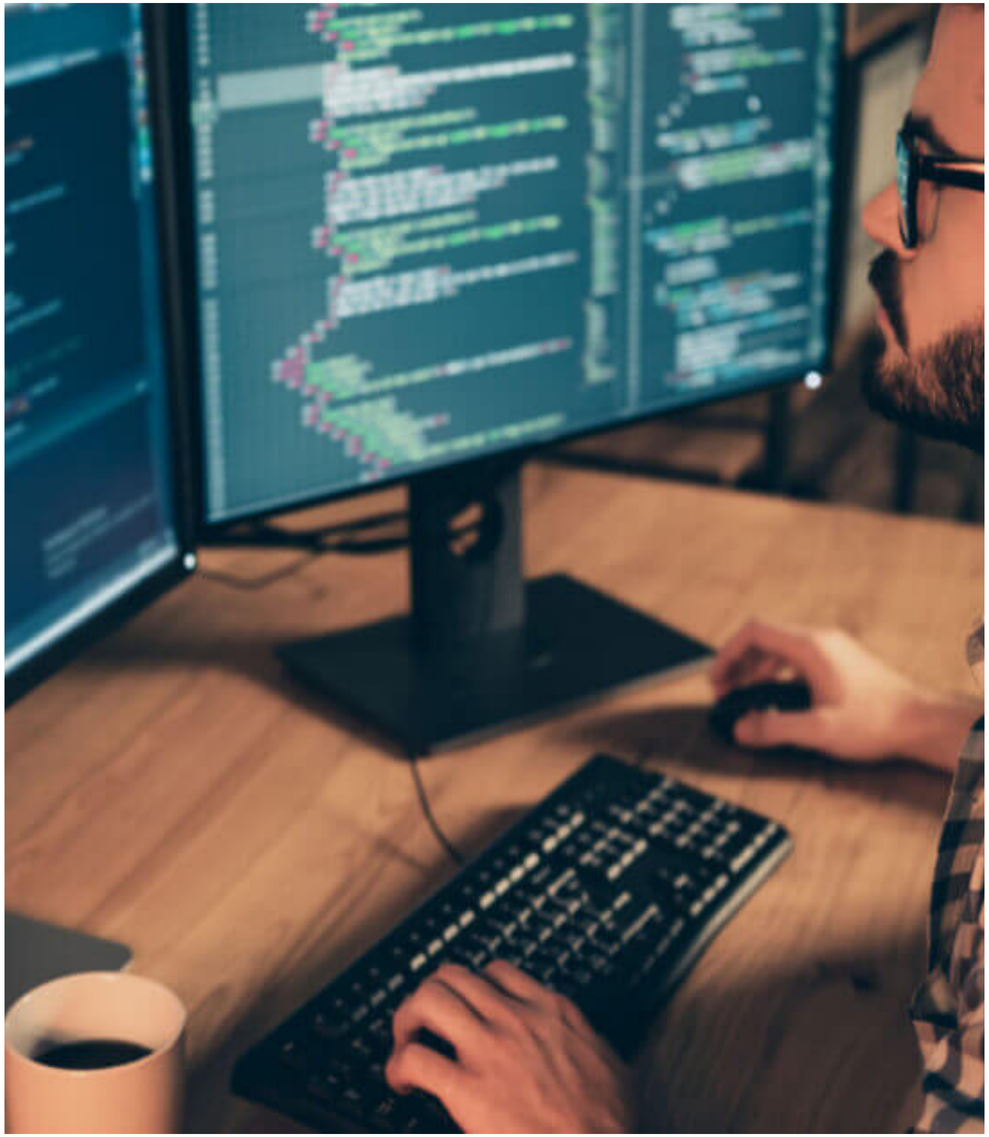
Improving stability through chaos

Introduction to chaos engineering

Definition of Chaos

- A state of utter confusion
- A confused mass or mixture
- A state of things in which change is supreme
- The inherent unpredictability in the behavior of a complex system (such as the the atmosphere or the beathing heart)

https://www.merriam-webster.com/dictionary/engineering



Definition of Engineering

- The activities or function of an engineer (*d'oh*)
- The application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people
- The design and manufacture of complex products

https://www.merriam-webster.com/dictionary/engineering

Hi! My name is Antti

Chaotic Good

Current
SRE @ SOK

Previous
DevOps & Azure @ Polar Squad
Azure @ Cybercom
Infra & Architecture @ Elisa

S.P.E.C.I.A.L.
System design
On-call & 24/7
Automation
Security

https://www.linkedin.com/in/anttipoutiainen/

Problem statement

- Distributed nature of computing has accelerated the speed and complexity of digital services. Systems must be built to support rapid changes.

- Cloud platforms and consistent APIs support creating large infrastructures in mere seconds

- As the application platforms grow and become more complex, the need to validate the ***resiliency*** of the platform becomes even more so important.

- Testing the application features is a critical part of the equation but often does not validate the ***resiliency*** or capabilities like failover

- Change is consistent. How do we keep up?

Resiliency is the ability to avoid, sustain or mitigate impact from adverse events and regain a healthy state as soon as possible.

THE NETWORK IS RELIABLE

LATENCY IS ZERO

BANDWIDTH IS INFINITE

THE NETWORK IS SECURE

TOPOLOGY DOESN'T CHANGE

THERE IS ONLY ONE ADMINISTRATOR

TRANSPORT COST IS ZERO

THE NETWORK IS HOMOGENOUS

What is chaos engineering?

Chaos engineering is a practice that introduces integration testing to your infrastructure

Poke your infra and apps with a “stick”

The ”stick” is not really a stick

Identify bottlenecks

Pioneered by *Netflix* and their *Chaos Monkey*

Often conducted as Game Days or similar

CHAOS DOES NOT MEAN RANDOM

How is chaos engineering different?

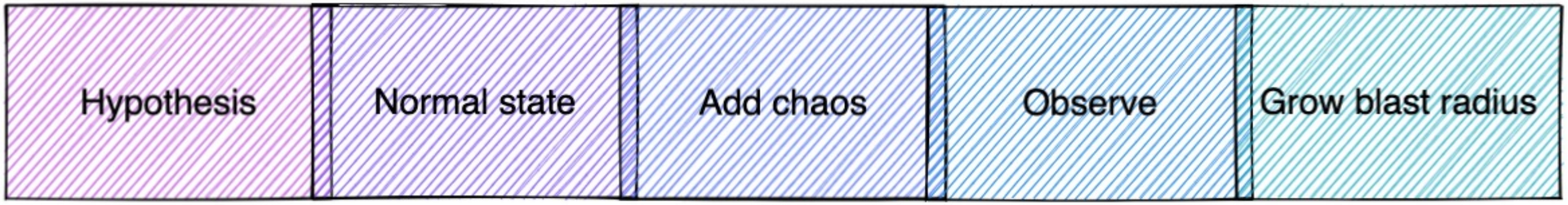
- Many organisations have practiced chaos engineering without calling it as such.
- You can call it testing, QA, Ops stuff or just engineering
- Tech industry has a tendency to label things without a reason
- Certain industries have practiced some forms of resiliency engineering for decades (Healthcare, Aerospace, MilTech…)
- TL;DR find the practice that works best for your teams

Motivations

- DOWNTIME COSTS MONEY
- IMPROVED SYSTEM DESIGN
- IMPROVE VISIBILITY WHEN LOOKING IN FROM THE OUTSIDE
- VALIDATE INCIDENT MANAGEMENT AND ALERTING
- IMPROVED CUSTOMER EXPERIENCE

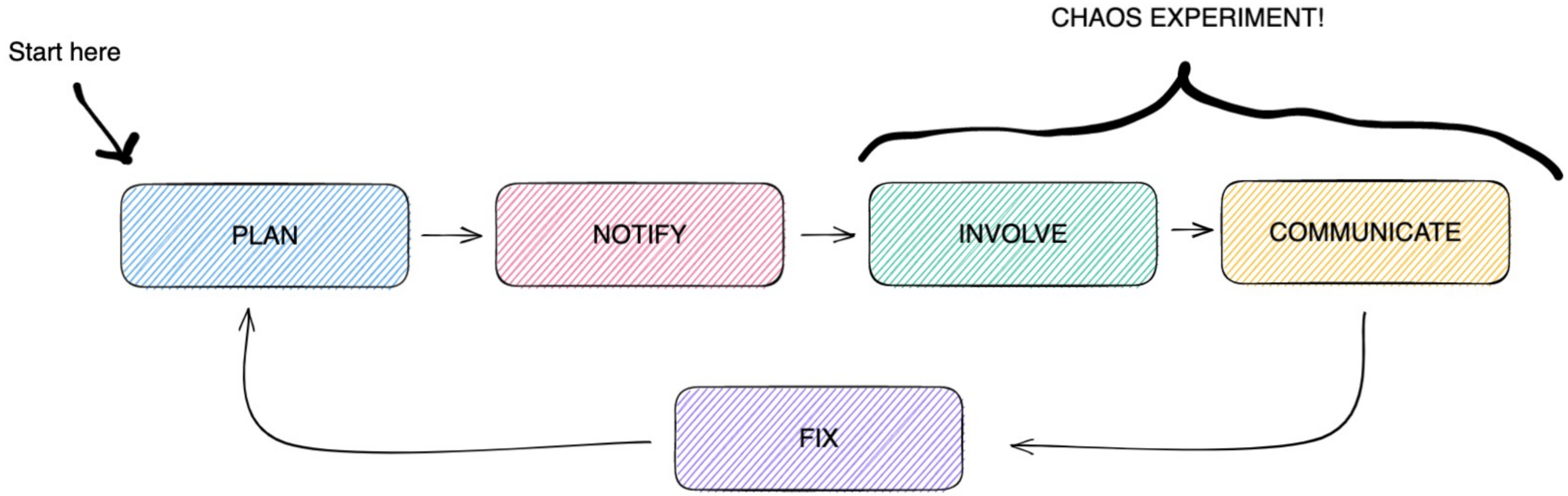
How to plan an experiment

What do we need to run an experiment?



How to run an experiment

What does the actual game day look like?



Common experiments

Use the common experiments to your advantage, and mix them up to add more chaos

- **Increased latency**
- **Kill a server or a pod**
- **Block network access (security groups)**
- **Overwrite HTTP codes and API responses**
- **Fill a disk or storage with spoofed data**
- **Block DNS requests (ALWAYS WORKS :-D)**

Tools

Exercising chaos is not a matter of tooling, but they help you get started and prevent each team from having to reinvent the wheel

- **Chaos Mesh**: Open-source chaos for K8s
- **Chaos Monkey:** Tool for restarting servers and containers
- **Gremlin:** Enterprisey chaos suite
- **Failure-Lambda:** Serverless chaos on AWS
- **AWS Fault Injection Simulator:** AWS managed chaos
- **Azure Chaos Studio:** Azure managed chaos

WRAP UP

Running exercises will increase the confidence to your platform. Higher reliability leads to happier customers.

Chaos engineering is a single tool in the toolbox.

See what works for your organisation. Start small and iterate.

Have fun!

More reading

Chaos engineering resources
https://github.com/dastergon/awesome-chaos-engineering/blob/master/README.md

Principles of Chaos
https://principlesofchaos.org/

Lessons from the Lunar landing:
https://flyingbarron.medium.com/out-of-this-world-lessons-from-the-apollo-lunar-landings-part-i-703ff4f872ce

KIITOS!