Chaos Engineering

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Agenda

- Introduction
- Theoretical concepts
- Methodology
- Gremlin with example
- Take-home message

Vaccine for software

We inject harm to build immunity[1]

Chaos Engineering

Chaos Engineering is the discipline of experimenting on a system in order to build confidence in the system’s capability to withstand turbulent conditions in production. [2]

Chaos Engineering[1][2]

- Inject faults into the system to assess resilience
- Controlled and planned
- Done in production environment
- Build confidence in error handling and fault tolerance
- Proactive

Chaos Engineering Core Concepts[3]

- Metrics
- Perturbation
- Hypothesis
- Experiment
- Blast Radius

Methodology[3]

- Define a steady state; should be expressed in terms of metric value ranges
- Perturbations; what faults to inject
- Control Phase vs Experimental Phase
- Hypothesize about the outcome
- Carry out chaos experiment
- Validate or Falsify hypothesis

Why Chaos Engineering?[5]

- Shift to the cloud and microservices
  - +73% of companies already have an application in the cloud[4]
- Some failure scenarios out of direct control
- Too complex to predict all failure scenarios
- Avoid costly outages by being prepared

Gremlin

- Hosted Chaos Engineering Framework
  - “Failure as a Service”
- Web based controller UI
- Deploy through Docker or Kubernetes
- Application and/or Infrastructure targeting

Matthew
Fornaciari

Kolton
Andrus

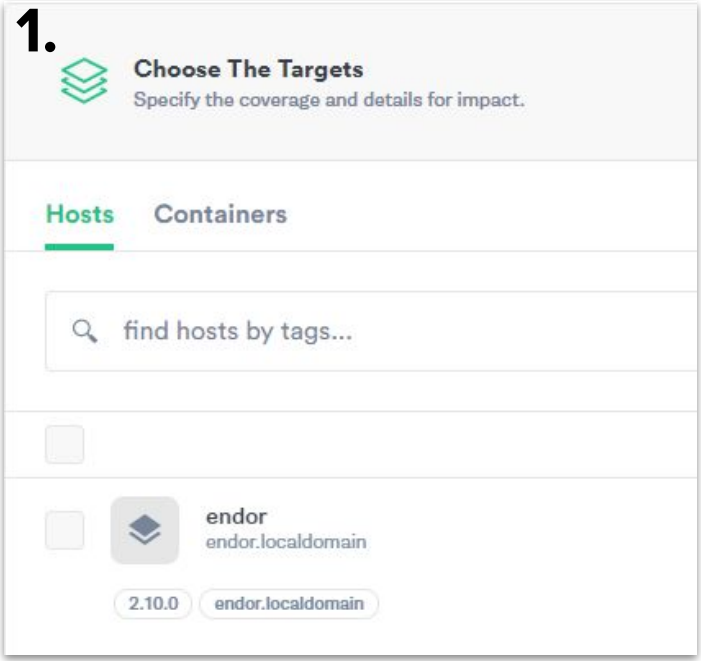
Practical example

(Setup)

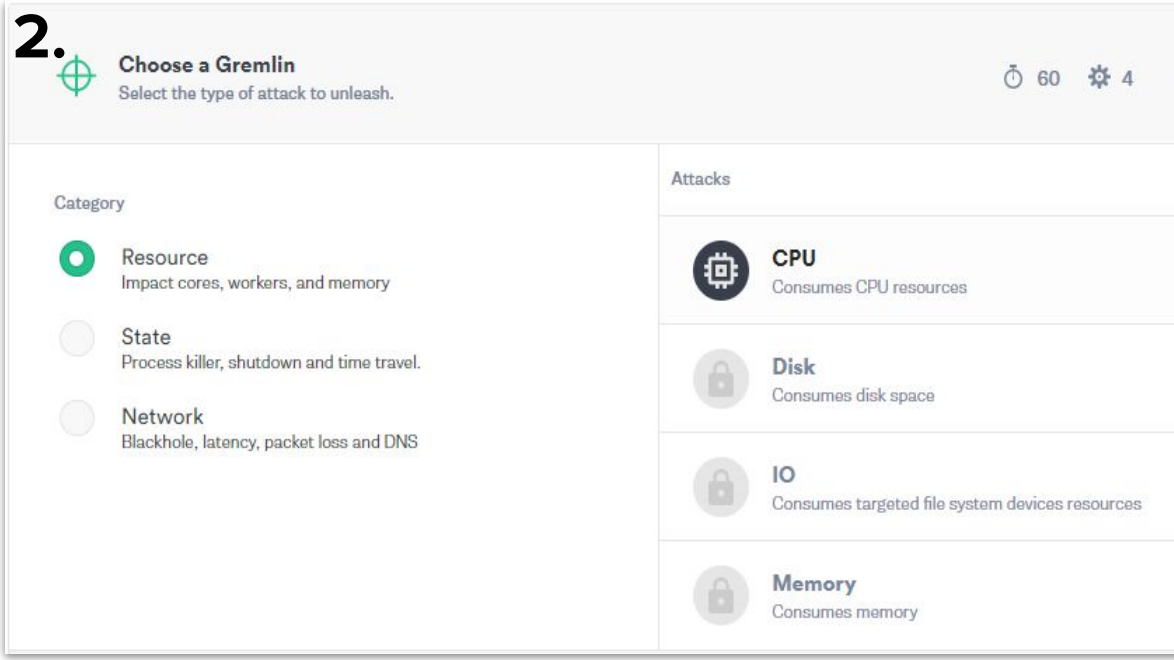
```
$ export GREMLIN_TEAM_ID=”...”
$ export GREMLIN_TEAM_SECRET=”...”
$ sudo docker run -d                                \
          --net=host --pid=host                     \
          --cap-add=NET_ADMIN --cap-add=SYS_BOOT    \
          --cap-add=SYS_TIME --cap-add=KILL         \
          -e GREMLIN_TEAM_ID                        \
          -e GREMLIN_TEAM_SECRET                    \
          -v /var/run/docker.sock                   \
          -v /var/log/gremlin                       \
          -v /var/lib/gremlin                       \
          gremlin/gremlin daemon

$ docker ps
CONTAINER ID        IMAGE               COMMAND
c48db9cab315        gremlin/gremlin     "/entrypoint.sh daem…" [...]
```

1.



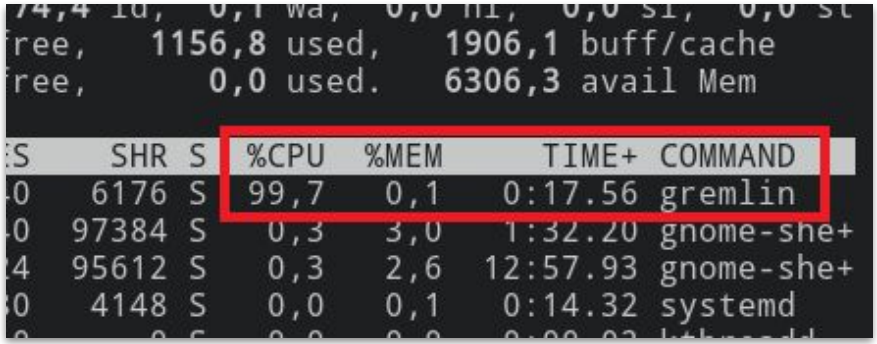
2.



Practical example

(Execution)

3.



Take-home message

- New and emergent practice
- Empirical methodology
- Provides new information about the system
- Researched at KTH

References

1. Gremlin. Intoduction to Chaos Engineering with Gremlin's ceo & co-founder, Kolton Andrus (Video).. https://www.youtube.com/watch?v=F26__uBAyOM February 2019 [Accessed Apr 29 2019]
2. Aaron Blohowiak Nora Jones Ali Basiri Casey Rosenthal, Lorin Hochstein. Chaos Engineering. https://www.oreilly.com/ideas/chaos-engineering [Accessed Apr 29 2019], September 2017
3. Long Zhang, Brice Morin, Philipp Haller, Benoit Baudry, and Martin Monperrus. A Chaos Engineering System for Live Analysis and Falsification of Exception-handling in the JVM. arXiv preprint arXiv:1805.05246, 2018.
4. 2018 IDG Cloud Computing survey
5. Gremlin Inc. Chaos engineering: Breaking your systems for fun and profit. https://www.gremlin.com/uploads/20171210%20%E2%80%93%20Chaos%20Engineering%20White%20Paper.pdf [Accessed: Apr 29 2019], December 2017.

Thank you for listening