Controlled Chaos

The Inevitable Marriage of DevOps & Security

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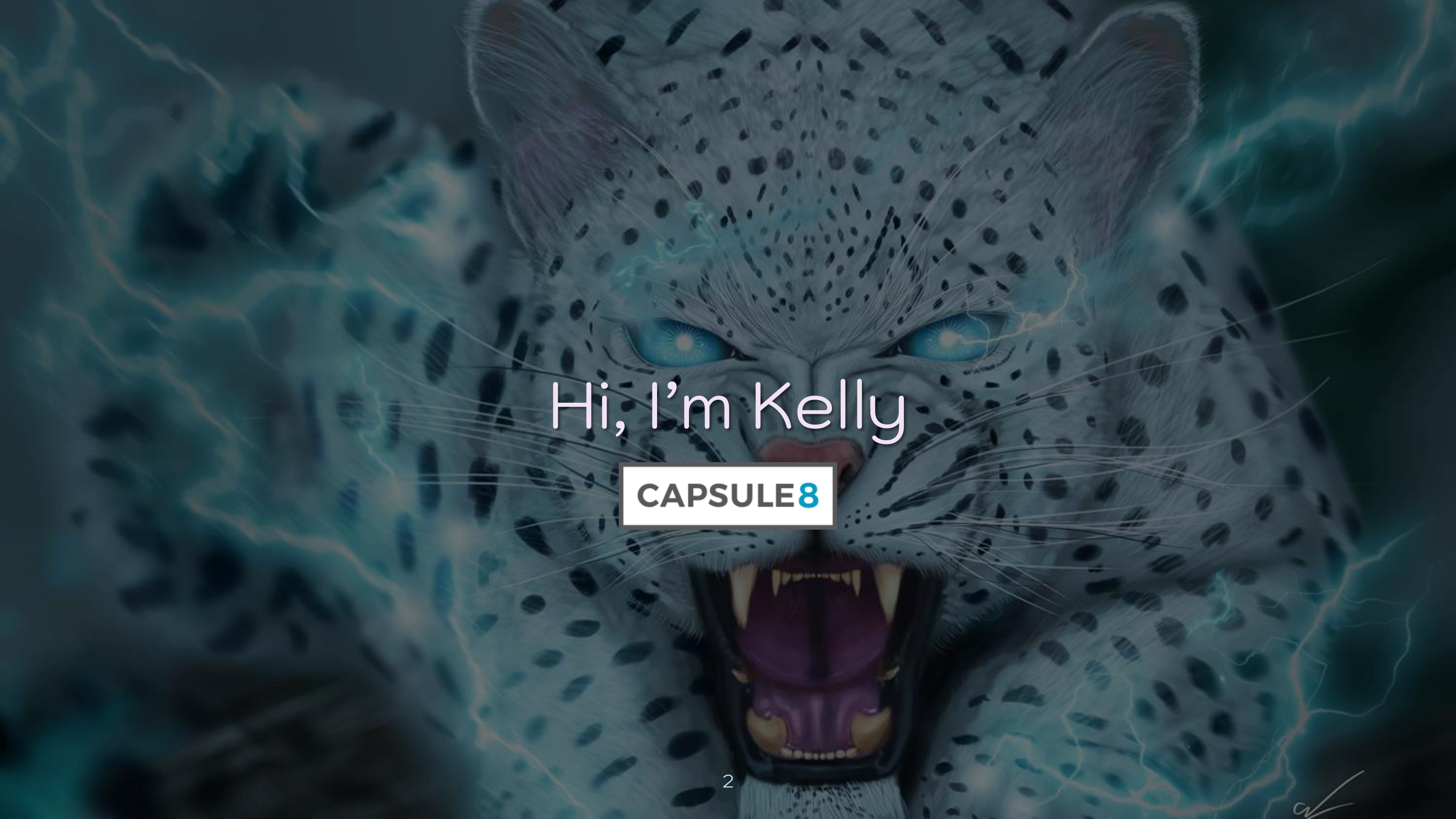
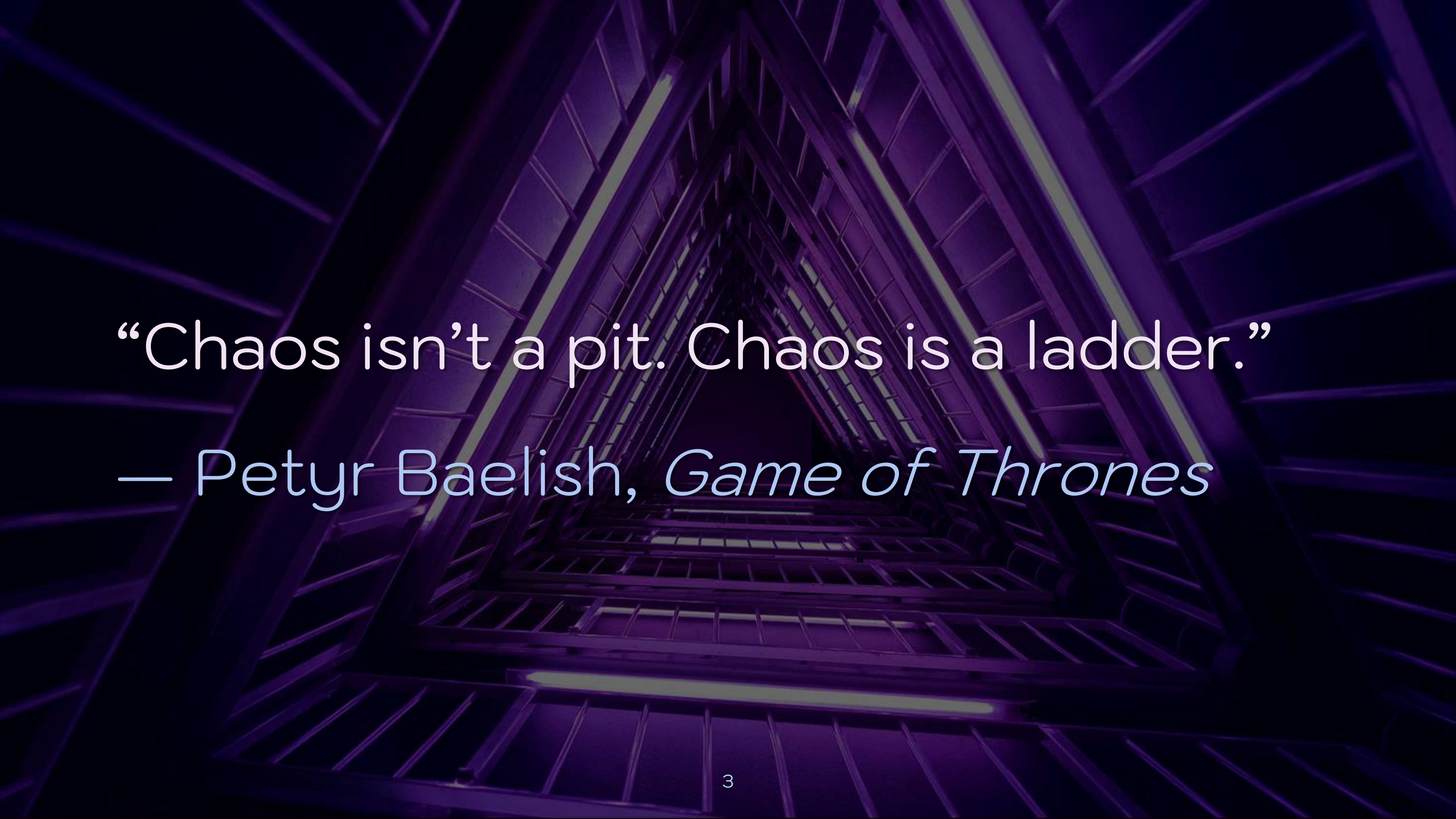
Velocity Berlin 2019



Hi, I’m Kelly

CAPSULE8

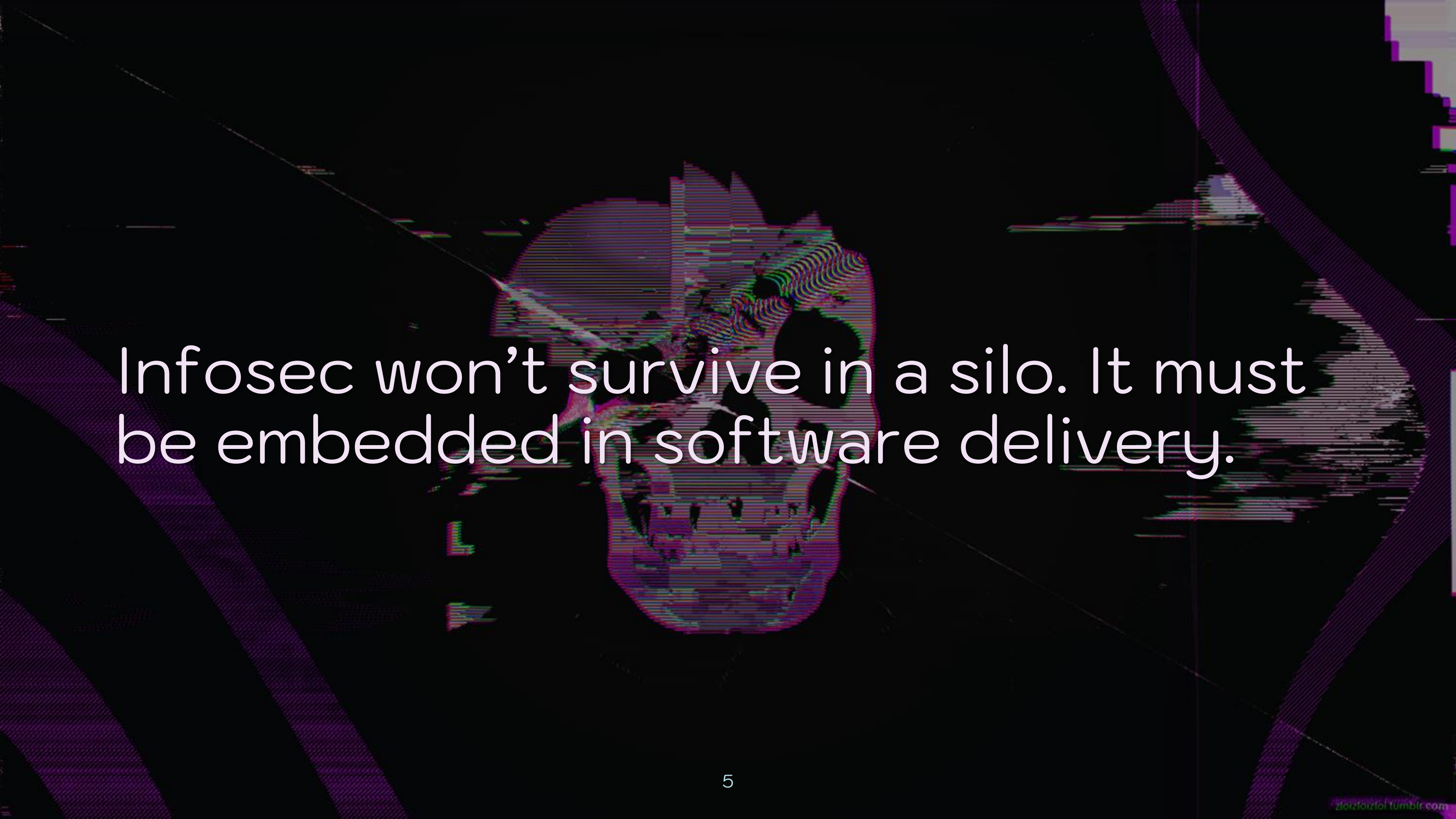


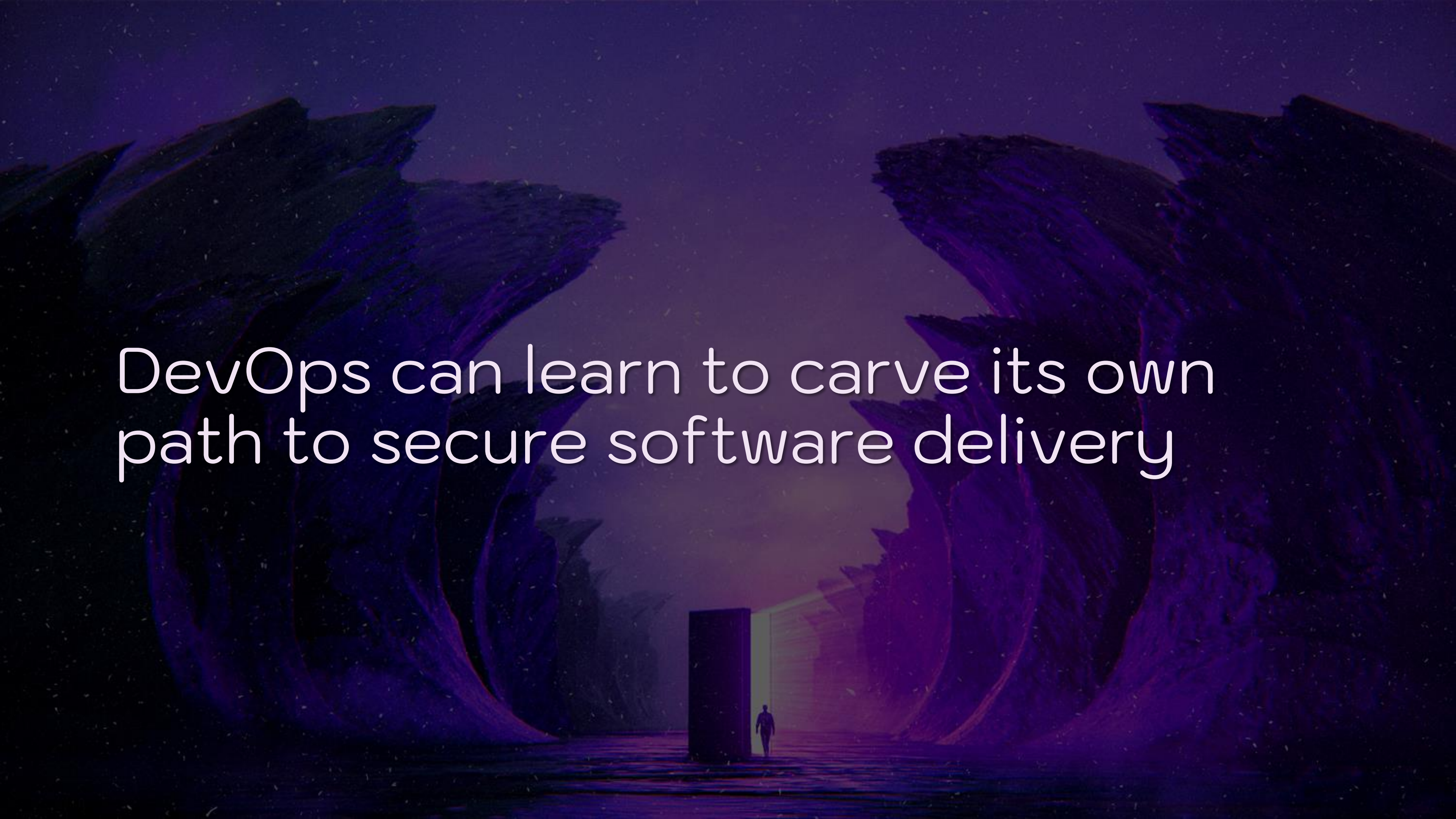
“Chaos isn’t a pit. Chaos is a ladder.”

— Petyr Baelish, *Game of Thrones*

Infosec has a choice: marry DevOps or be rendered impotent & irrelevant

Infosec won’t survive in a silo. It must be embedded in software delivery.





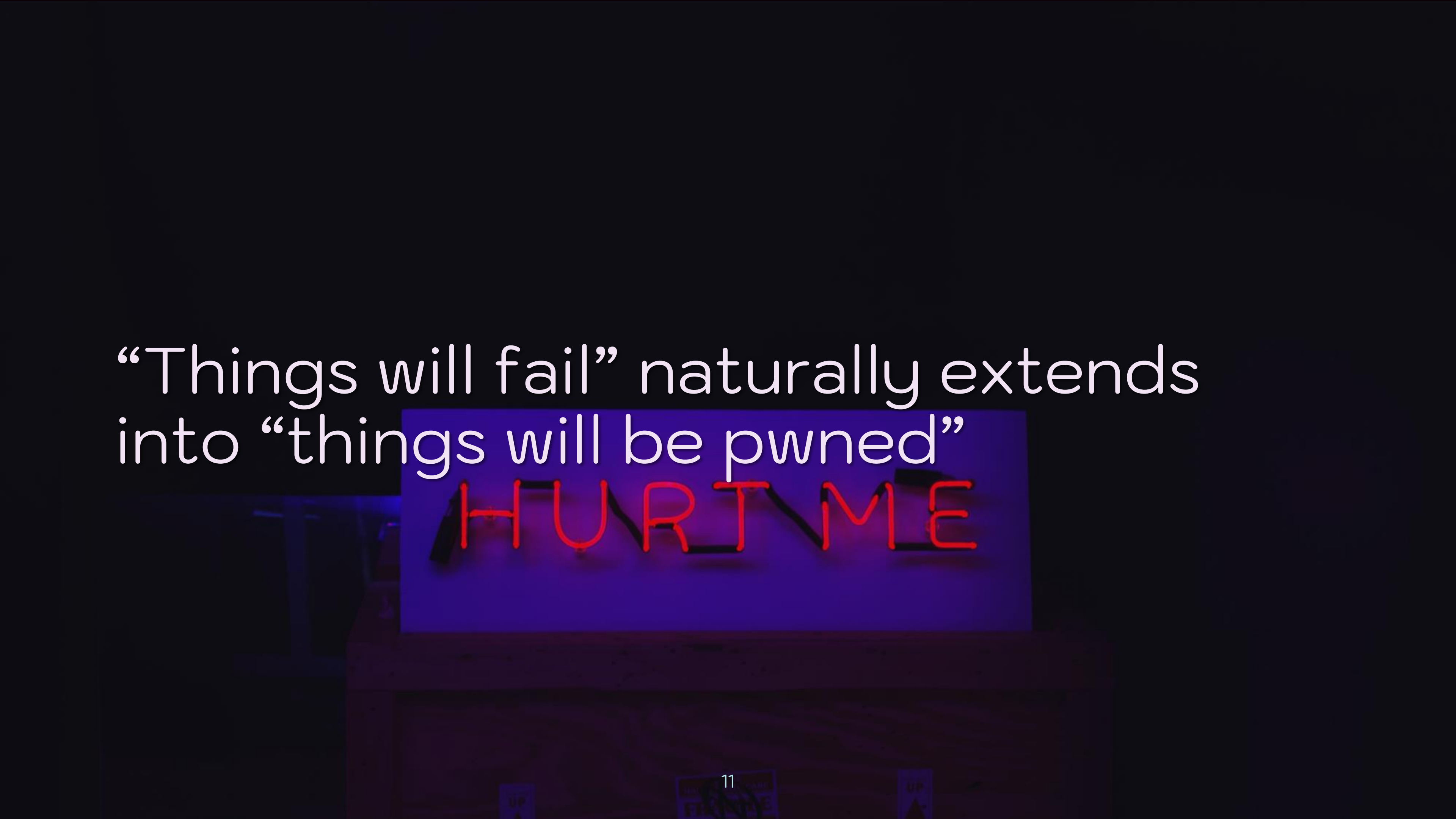
DevOps can learn to carve its own path to secure software delivery

How can controlling chaos create a marriage of infosec and DevOps?

1. Chaos Theory
2. Time to D.I.E.
3. A Phoenix Rises

Chaos Theory

Chaos engineering = continual experimentation to test resilience



"Things will fail" naturally extends into "things will be pwned"

Security failure is when security controls don’t operate as intended

What are the principles of chaotic security engineering?

1. Expect that security controls will fail & prepare accordingly

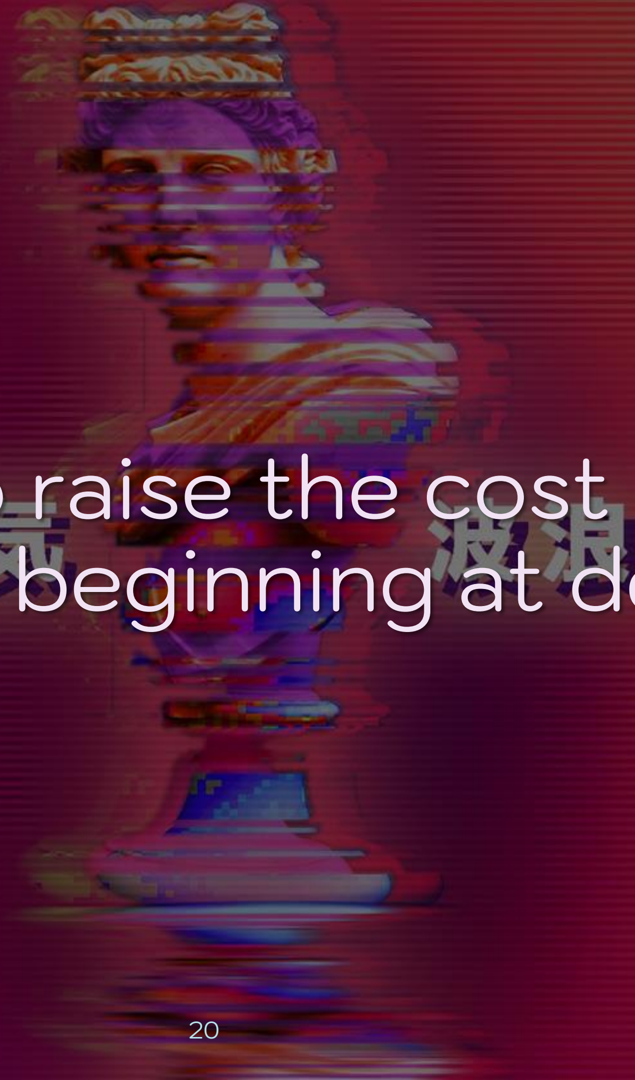
2. Don’t try to avoid incidents – hone your ability to respond to them

Game days: like planned firedrills

Prioritize security game days based on potential business impacts

Decision trees: start at target asset, work back to easiest attacker paths

Determine the attacker’s least-cost path (hint: it doesn’t involve 0day)

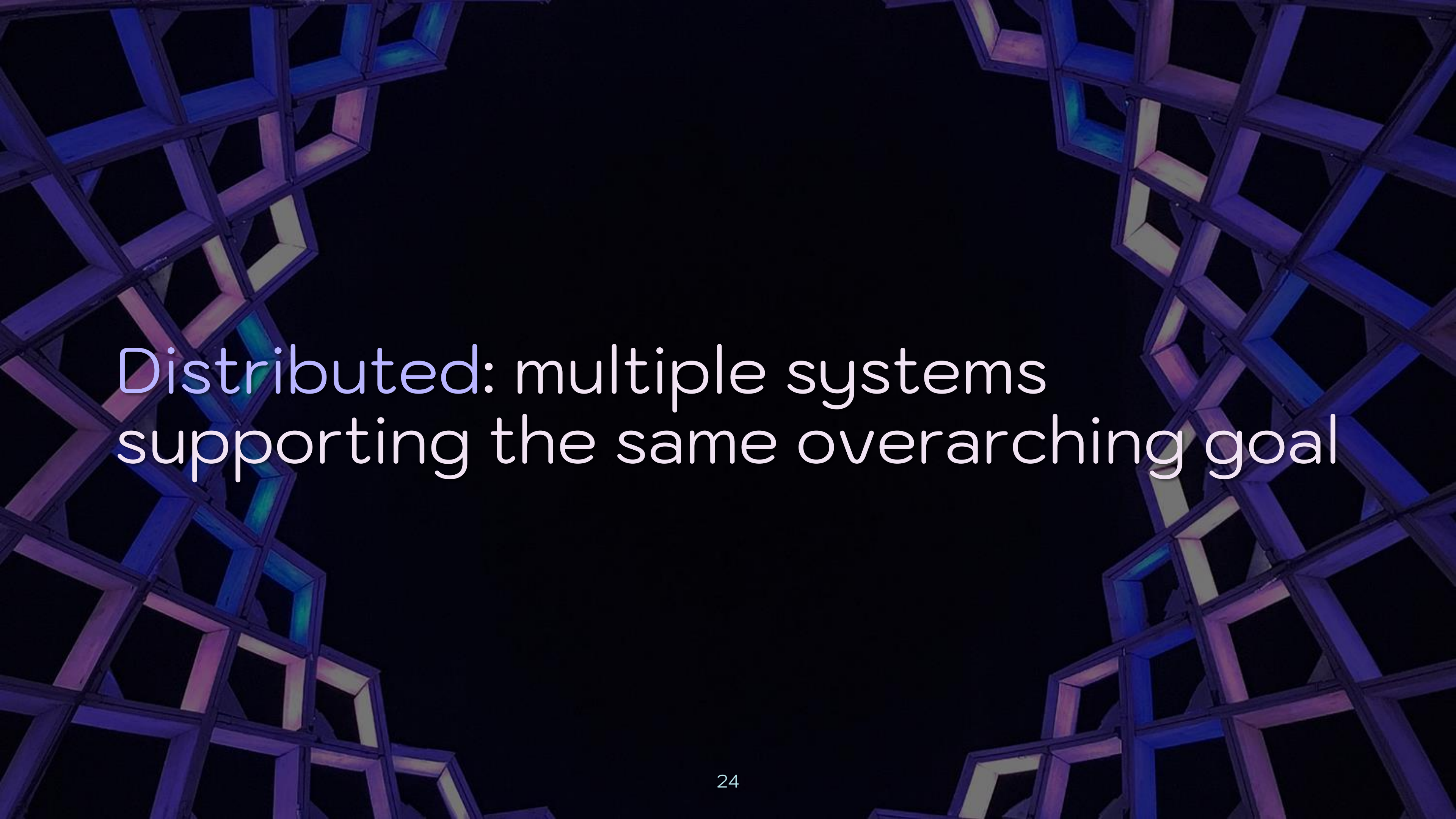


Your goal is to raise the cost of attack, ideally beginning at design

Time to D.I.E.

We need a model promoting qualities that make systems more secure

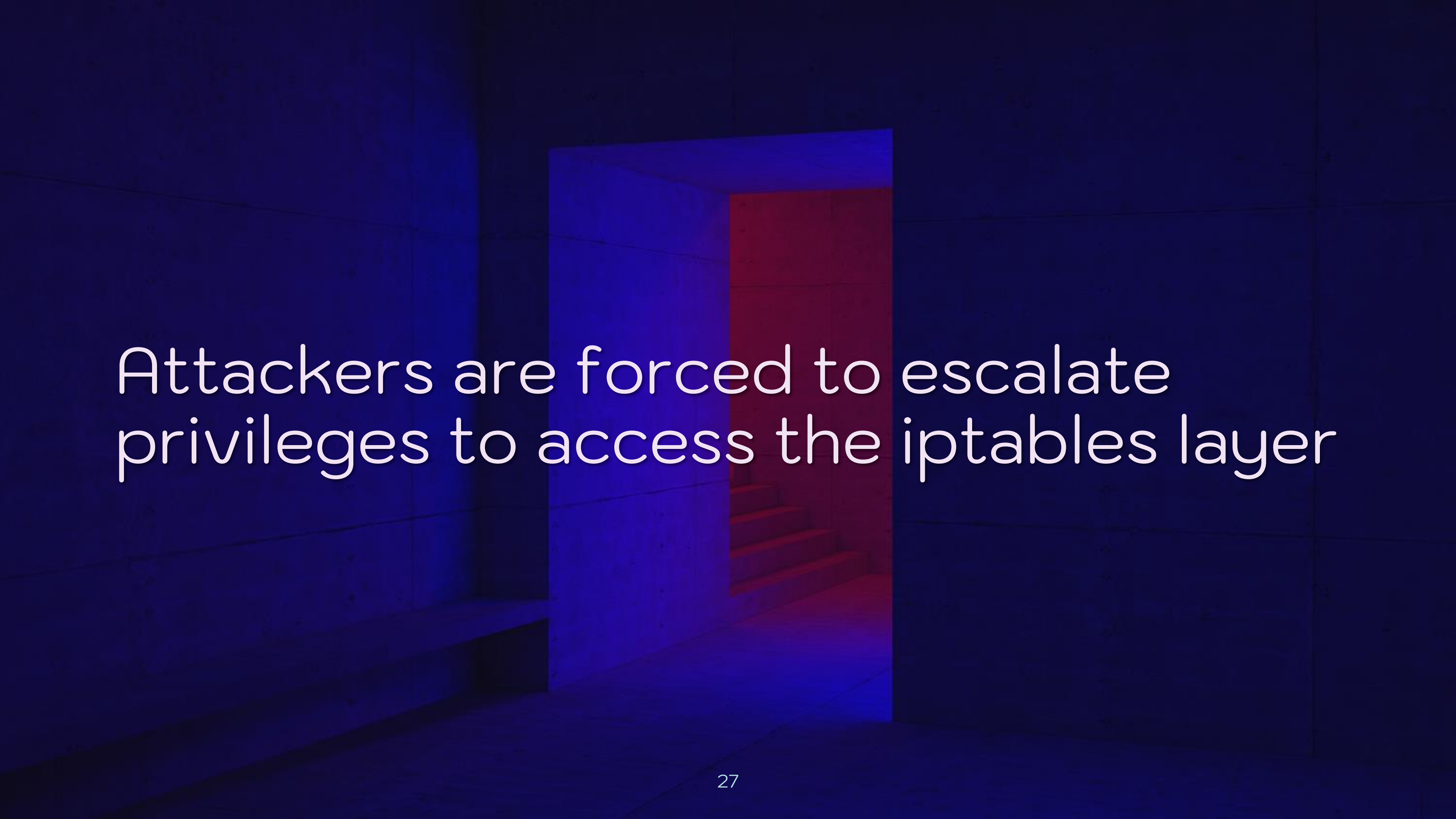
Enter the D.I.E. model by Sounil Yu: Distributed, Immutable, Ephemeral



Distributed: multiple systems supporting the same overarching goal

Distributed infrastructure reduces risk of DoS attacks by design

A service mesh is like an on-demand VPN at the application level



Attackers are forced to escalate privileges to access the iptables layer

Immutable: infrastructure that doesn’t change after it’s deployed

Immutable infra is more secure by design – ban shell access entirely

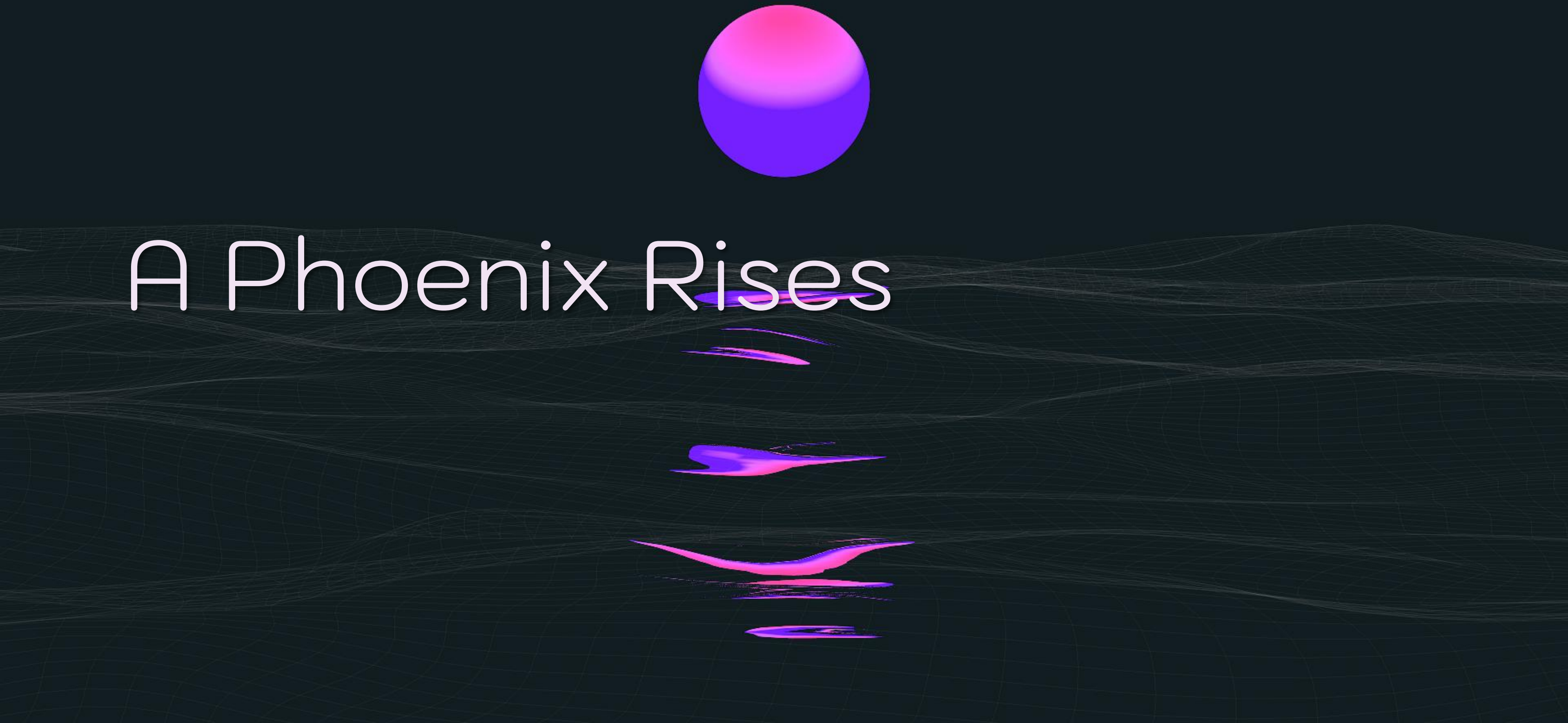
Patching is no longer a nightmare with version-controlled images

Ephemeral: infrastructure with a very short lifespan (dies after a task)

Ephemerality creates uncertainty for attackers (persistence = nightmare)

Installing a rootkit on a resource that dies in minutes is a waste of effort

Optimizing for D.I.E. reduces risk by design & supports resilience

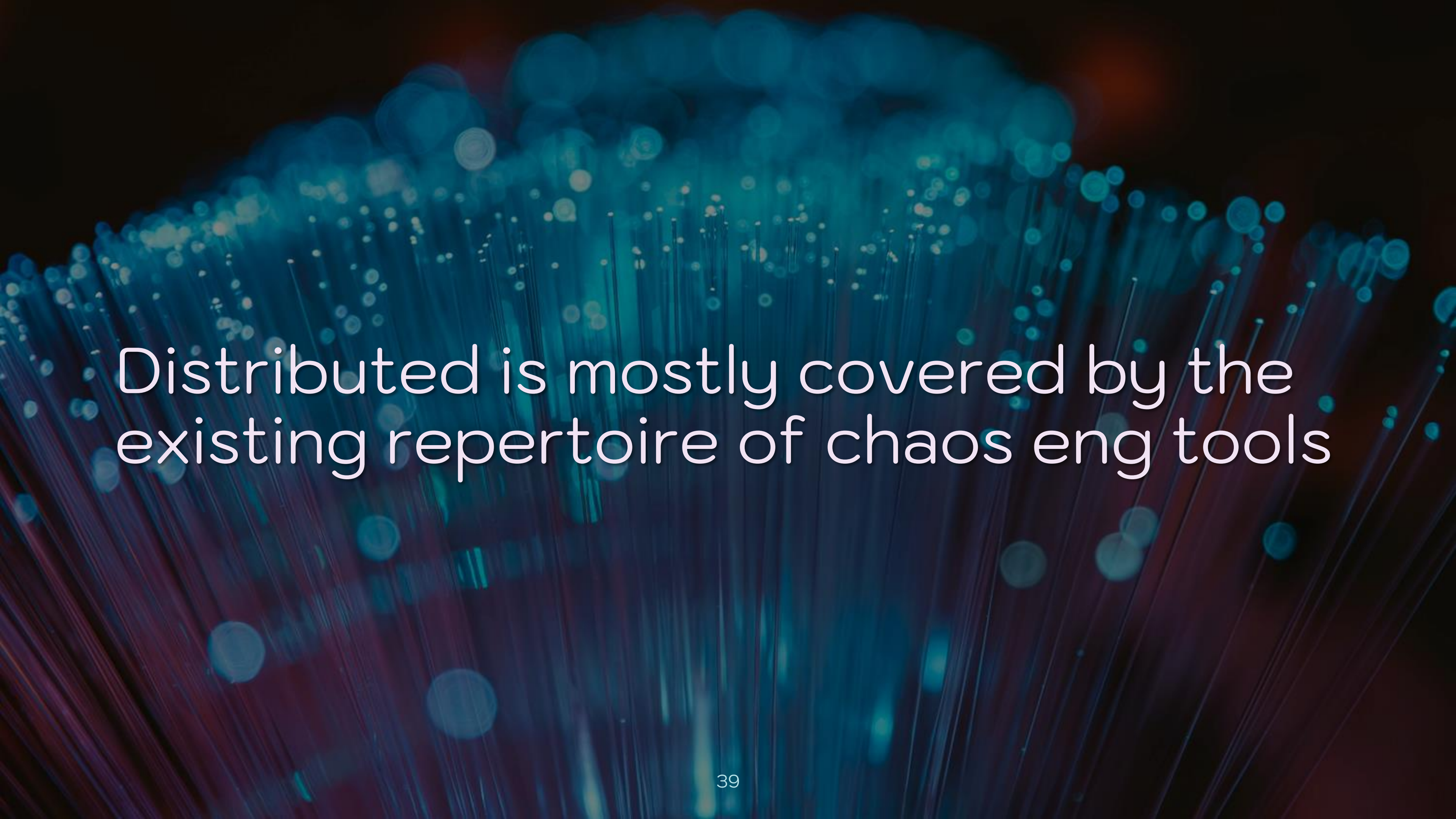


A Phoenix Rises

Begin with “dumb” testing before moving to “fancy” testing

D.I.E.ing is an art, like everything else

Controlling Chaos: Distributed



Distributed is mostly covered by the existing repertoire of chaos eng tools

Repurpose these tools, but make attackers the source of failure

Multi-region services present a fun opportunity to mess with attackers

Shuffle IP blocks regularly to change attackers’ lateral movement game

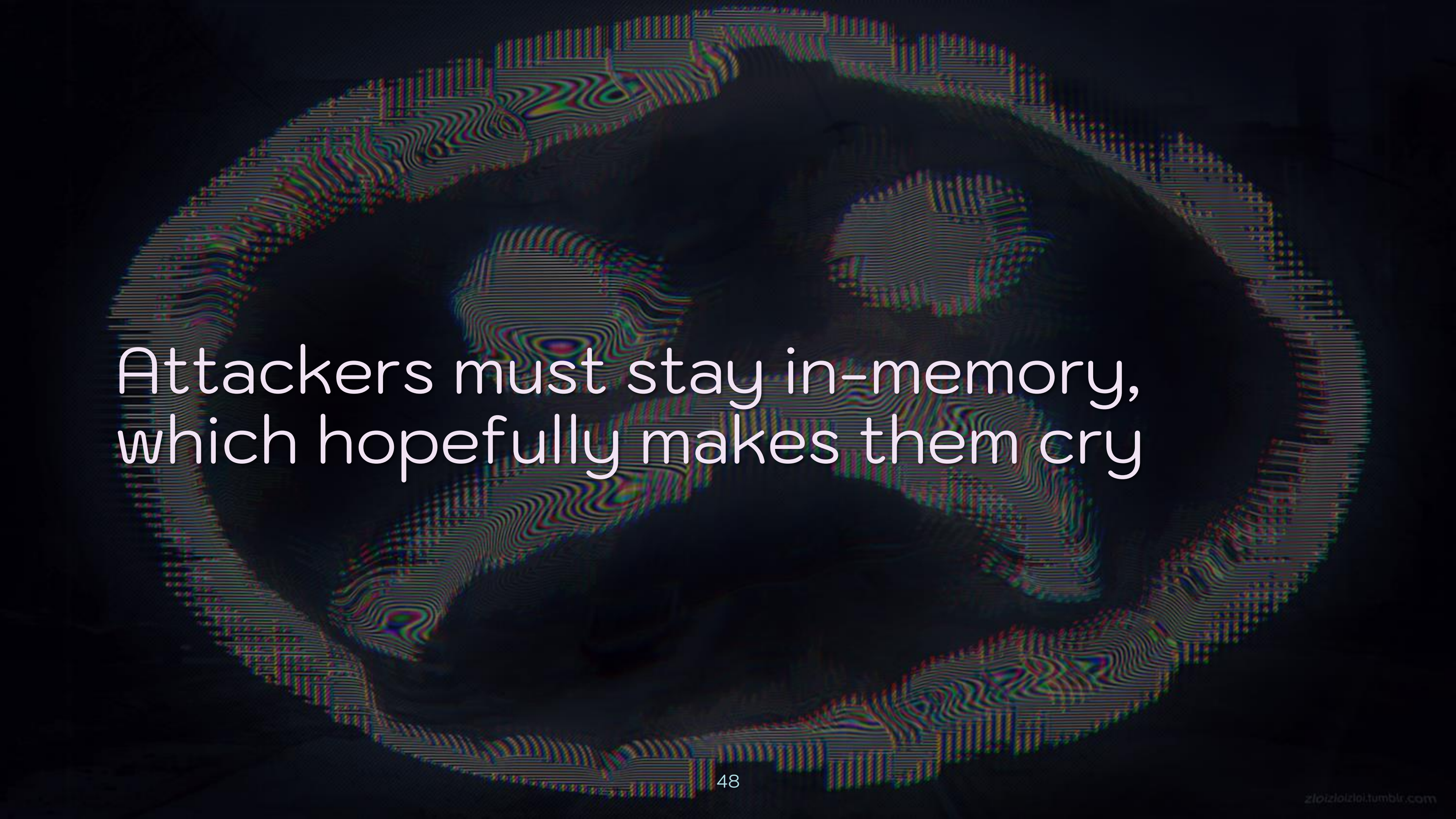
Test: inject failure into your service mesh to test authentication controls

Controlling Chaos: Immutable

Immutable infra is like a phoenix – it disappears & comes back a lot

Volatile environments with continually moving parts raise the cost of attack

Create rules like, “If there’s ever a write to disk, crash the node”



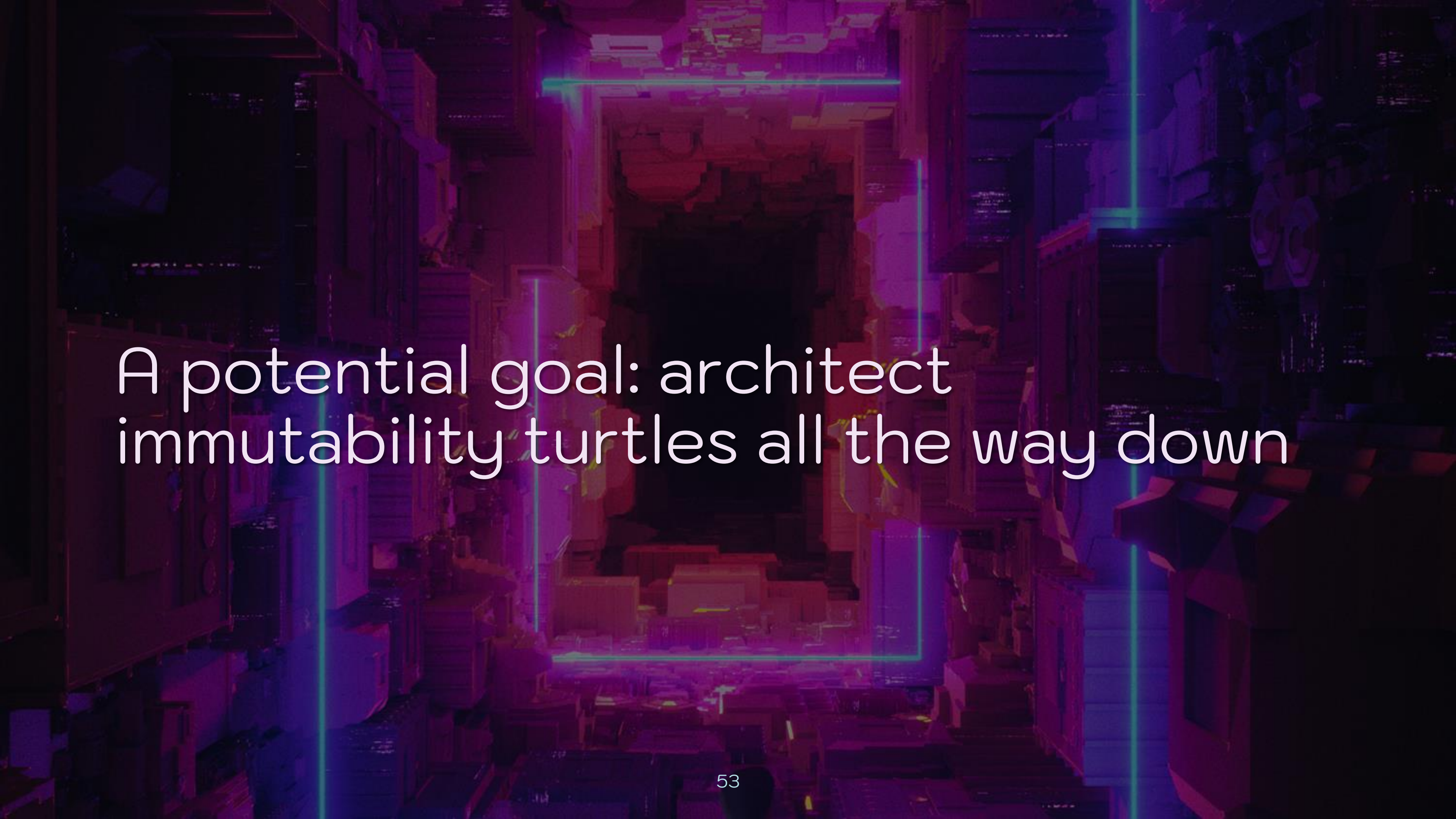
Attackers must stay in-memory, which hopefully makes them cry

Bonus: disallowing all local IO improves service reliability

Metasploit Meterpreter + webshell: Touch passwords.txt & kaboom

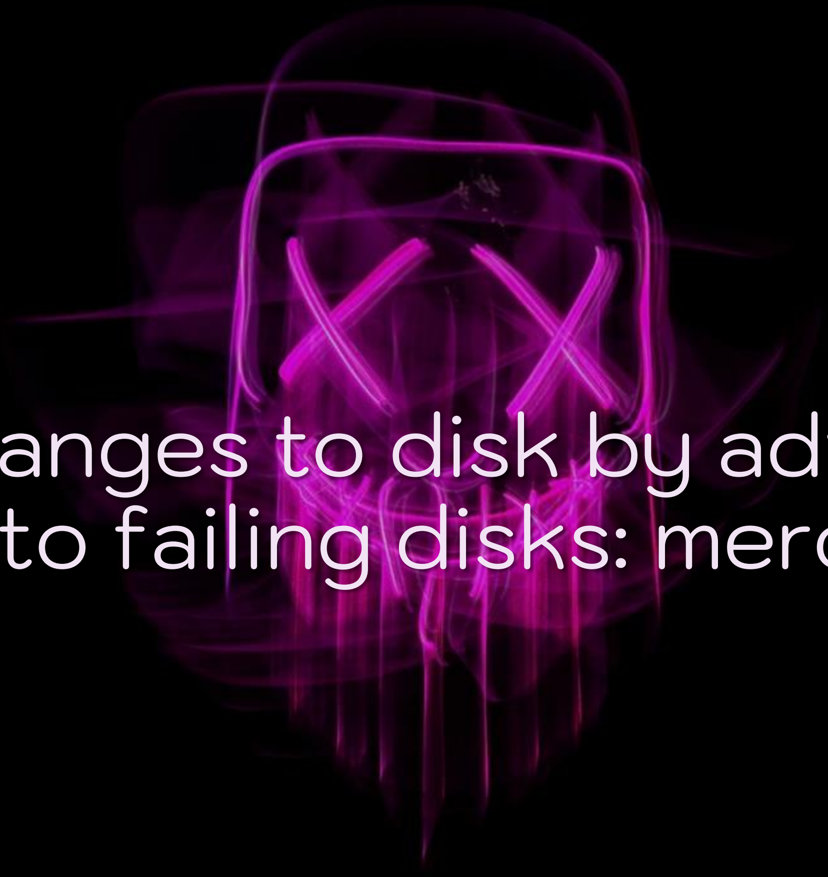
Build your Docker images with a garbage-filled “bamboozle layer”

Mark garbage files as “unreadable” to craft enticing bait for attackers



A potential goal: architect immutability turtles all the way down

Test: inject attempts at writing to disk to ensure detection & reversion



Treat changes to disk by adversaries similarly to failing disks: mercy kill

Controlling Chaos: Ephemeral

Most infosec bugs are stated-related – get rid of state, get rid of bugs

Reverse uptime: longer host uptime adds greater security risk

Test: change API tokens & test if services still accept old tokens

Test: retrograde libraries, containers, other resources in CI/CD pipelines

Test: inject hashes of old pieces of data to ensure no data persistence

Leverage lessons from toll fraud – cloud billing becomes security signal

Test: exfil TBs or run a cryptominer to inform billing spike detection

Conclusion

Chaos/resilience are natural homes for infosec & represent its future.

The future of infosec involves unified responsibility & accountability.

Security can be innovative and fuel the engine of business as well.

“You must have chaos within you to give birth to a dancing star.”

— Friedrich Nietzsche

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