What Cloud Engineers Could Learn from Clouds

Laura Santamaria, Lead Developer Advocate
Dell Technologies

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Not these

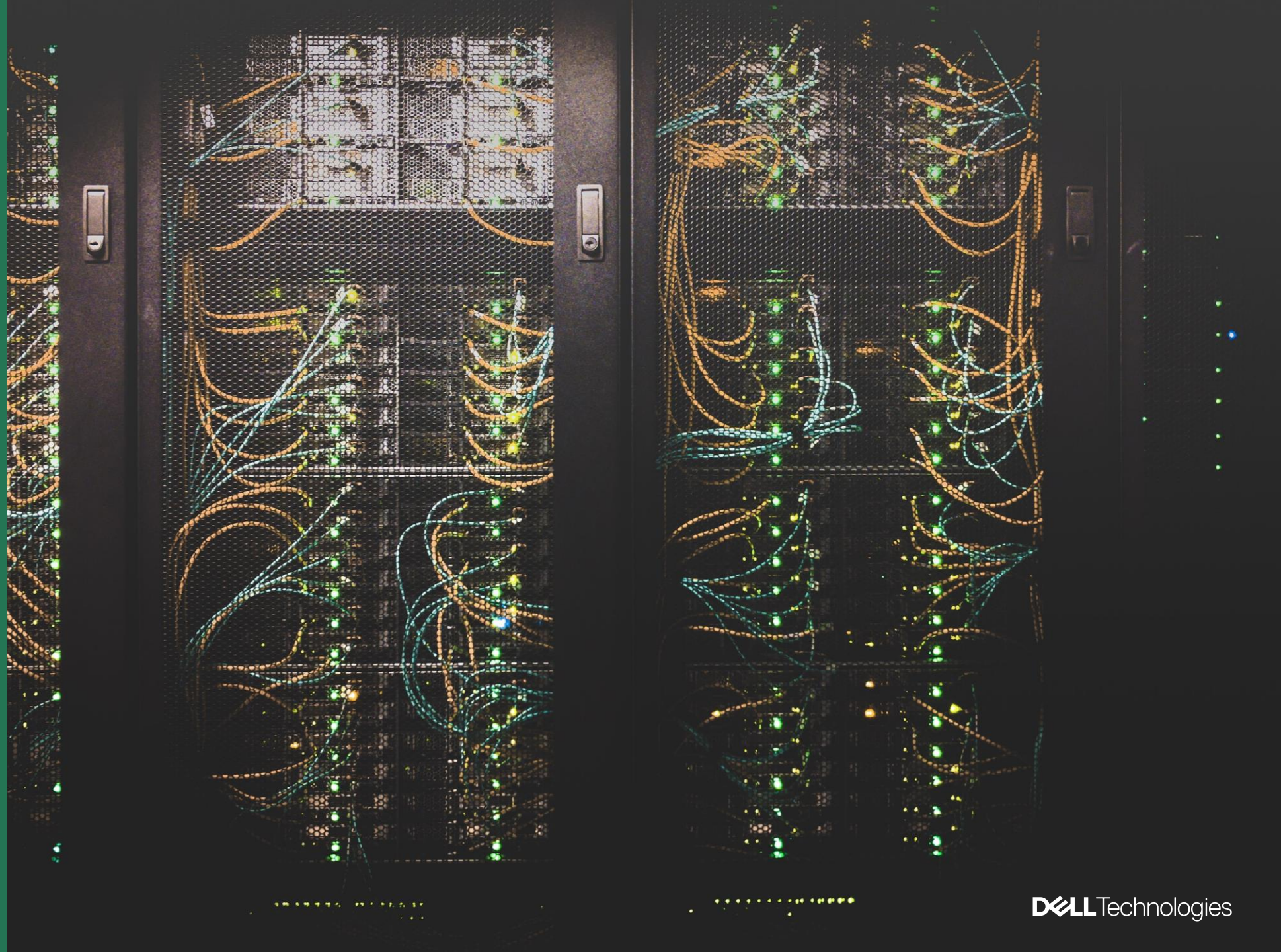

Photo by Taylor Vick on Unsplash

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These

Own work

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Intro

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History

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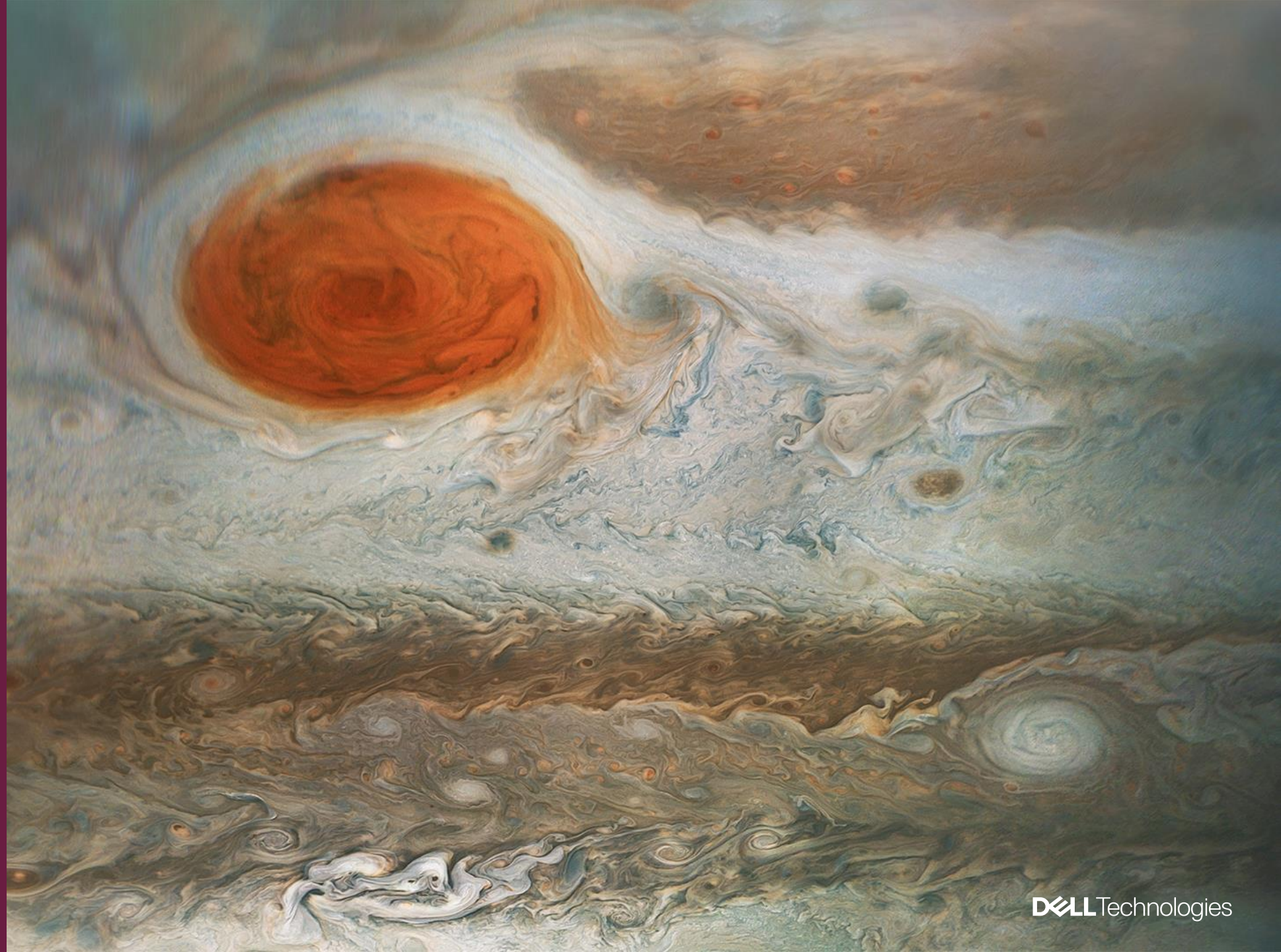
Planetary Atmospheres



Credits: NASA/JPL-Caltech/SwRI/MSSS/
Gerald Eichstädt /Seán Doran © CC NC SA

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Clouds and Clouds

Definitions

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Complex Systems

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A cloud physics example

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A cloud computing example

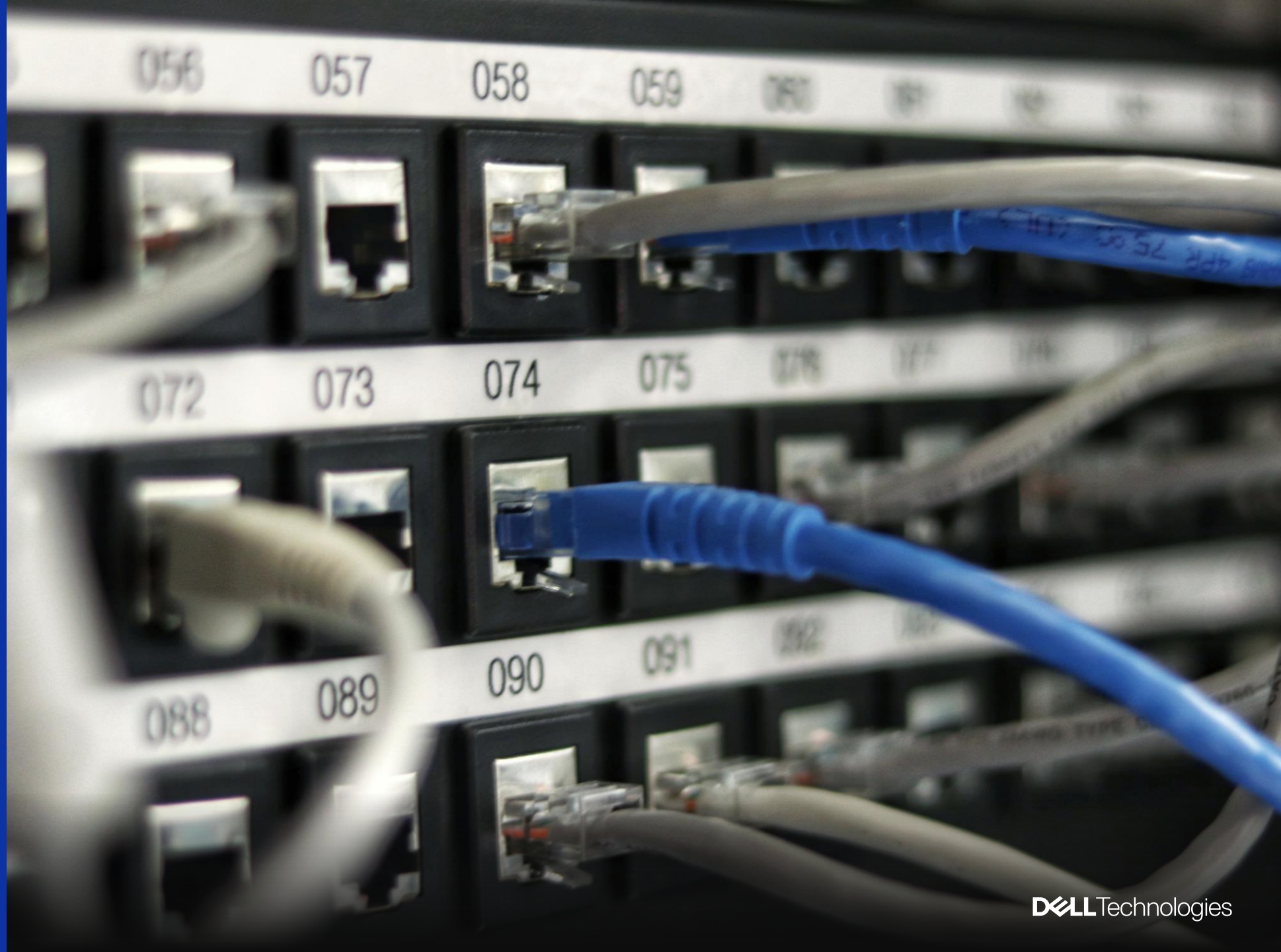

Photo by Jordan Harrison on Unsplash

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Chaos and Chaotic Systems

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A cloud physics example

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A cloud computing example

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Patterns

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A cloud physics example

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A cloud computing example

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All of this is what modeling is about.

Learning from clouds

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Understanding chaotic systems

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Observations

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Experiments

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Observation and Experimentation

Build
Destroy
Repeat

Mindful Experimentation

Chaos Experiments

Modeling and predicting behavior

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Data in, data out

Photo by NOAA on Unsplash

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Scale matters

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Modeling in computing systems

UML

TLA+

Alloy

TLA+ example (truncated)

From https://www.hillelwayne.com/modeling-deployments/

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variables
  servers = {"s1", "s2", "s3"},
  load_balancer = servers,
  update_flag = [s \in servers |->
FALSE],
  updated = [s \in servers |->
FALSE];

define
  SameVersion ==
    \A x, y \in load_balancer:
      updated[x] = updated[y]

  ZeroDowntime ==
    \E server \in load_balancer:
      updated[server] /= UPDATING
end define

fair process update_server \in
servers
begin
  Update:
    await update_flag[self];
    updated[self] := UPDATING;
  FinishUpdate:
    updated[self] := TRUE;
end process;

fair process start_update =
"start_update"
  begin
   StartUpdate:
     load_balancer := {"s1"};
     update_flag := [s \in servers
|->
      IF s = "s1" THEN FALSE ELSE
TRUE];
   Transition:
     await \A s \in (servers \
load_balancer):
       updated[s] = TRUE;
     load_balancer := servers \
load_balancer;
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   Finish:
     await updated["s1"] = TRUE;
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TLA+ example (truncated)

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end process;
...
```

Working with and around chaotic systems

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Models aren't perfect

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Model less complex things first

Photo by Marek Okon on Unsplash

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Models have limitations

Photo by Jiawei Zhao on Unsplash

Putting it all together

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Embrace failure

Trust your experience

Thanks

https://developer.dell.com

https://linktr.ee/nimbinatus

Feedback welcome!

→

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