# The Future is Proximal
# Why cloud fails IoT

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- I am going to cover the following:
  - How server-client paradigms persist
  - How yesterday's preferences are applied to today's needs
  - How the cloud fails IoT
  - Why the future is proximal

# The Oscillating Locus of Compute

In the beginning: resources were sparse and expensive.

The mainframe provided consolidated resources and distributed access.

Thus was born a logical paradigm that would permiate future architectures.

Starting in the 1970s and through the rise of the PC in the 1980's, computing became atomized.

Smaller devices with greater resources were able to operate independently.

Moore's law kept individual device capabilities ahead of the demand curve outside of industrial applications

The internet brought with it the possibility of remote resources being broadly available.

First widely used resources were primarily storage.

The web brought remote serving and then client-side processing.

Client-Server was back, baby!

Data centers grew to accommodate the new globally connected scale.

Server-side services grew in complexity.

Remote resources were now deployable, high-availability, and able to aggregate tremendous amounts of processing power and data.

# Along comes the smartphone.

## Resource limited:

| 2007 | iPhone 1 | Macbook (Santa Rosa) |
|---|---|---|
| **CPU** | 620 MHz RISC underclocked to 412 MHz | 2.0-2.2 GHz Core 2 Duo |
| **RAM** | 128MB | 1-6 GB |
| **Storage** | 4/8/16 GB | 80-250 GB |

Virtually all serious processing *had* to be offboarded.

Early apps were almost entirely webapps.

Client-Server model was back.

# Yesterday's Answers Applied to Today's Questions

Cloud had become our hammer and
IoT looked like a nail.

IoT today is largely deployed in a cloud-first architecture.

Devices depend on the cloud for user provisioning, device provisioning, data storage, compute, remote access.

This is good for some purposes and this is helpful to some models.

AI (for one) needs massive storage and processing (cloud) and large volumes of data (IoT).

If you provide a cloud service, IoT looks like a lot of clients to your servers.

Even locally we see the same paradigm.

Hub & Spoke model persists: Devices rely on Hubs for communication and coordination.

Leaf nodes often lack resources.

# The Cloud will fail IoT

The proximal argument has three pillars:

Latency

Security & Privacy

Scalability

The lightswitch is the perfect device:

Zero latency
100% uptime
Immediately comprehensible UX

Anything we do in IoT has to be as good as a light switch.

The cloud is not.
Disruptions. Complexity. Latency.

Security & Privacy by design.

More connections transiting out of the network = more threat vectors.

Devices should use the cloud by choice, not by default.

For each person N connected today the number of their connected devices is ~N+2 or N+3.

The future will see that number rise by 1-2 orders of magnitude.

Any disruption yields pain felt by all.

Networking infrastructure, both proximal and cloud will strain and those strains will yield pain to end users.

Devices with poor architectures will overwhelm their available resources.

# The future is Proximal

Cloud is like a tree.

Time to turn the tree upside down.

IoT can provide many of the features of the cloud.

Self-healing systems can provide high-availability, extensible resources.

When disruptions occur, each network - or network segment - is discrete and isolates the disruption.

Intelligently designed architectures can identify resources and utlize them efficiently.

Lower resource devices can leverage higher resource devices locally.

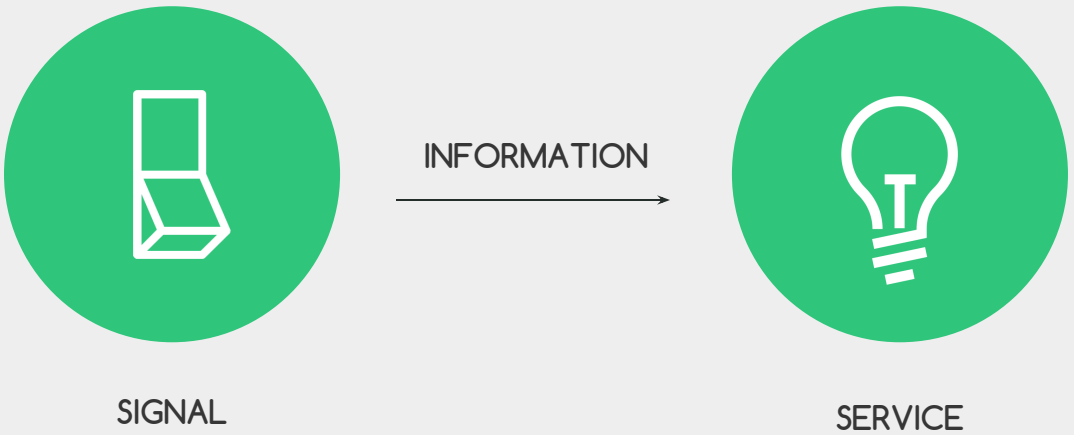
Interface-less or interface-poor devices can leverage better interfaces locally.

As devices become more powerful, more resources are available and more resources are idle.

Fog computing leverages the availability.

Smarter systems will be able to broker resources proximally and autonomously.

# The Great Unbundling To Come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# Thanks - Questions?

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