College of Information Studies

University of Maryland Hornbake Library Building College Park, MD 20742-4345

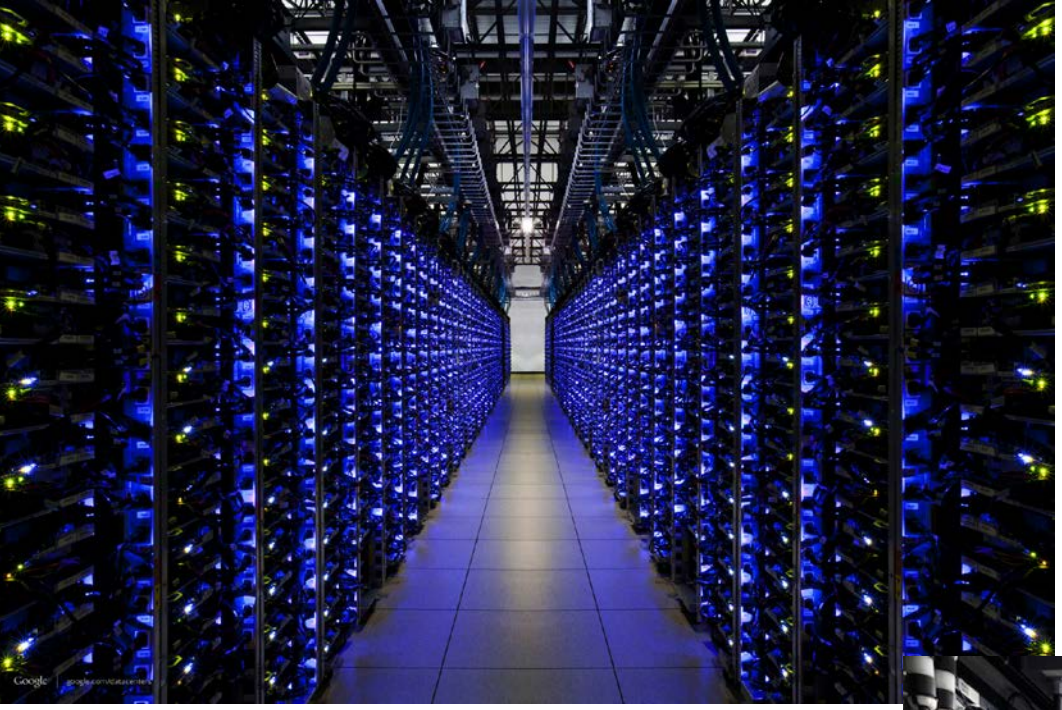
Data Centers

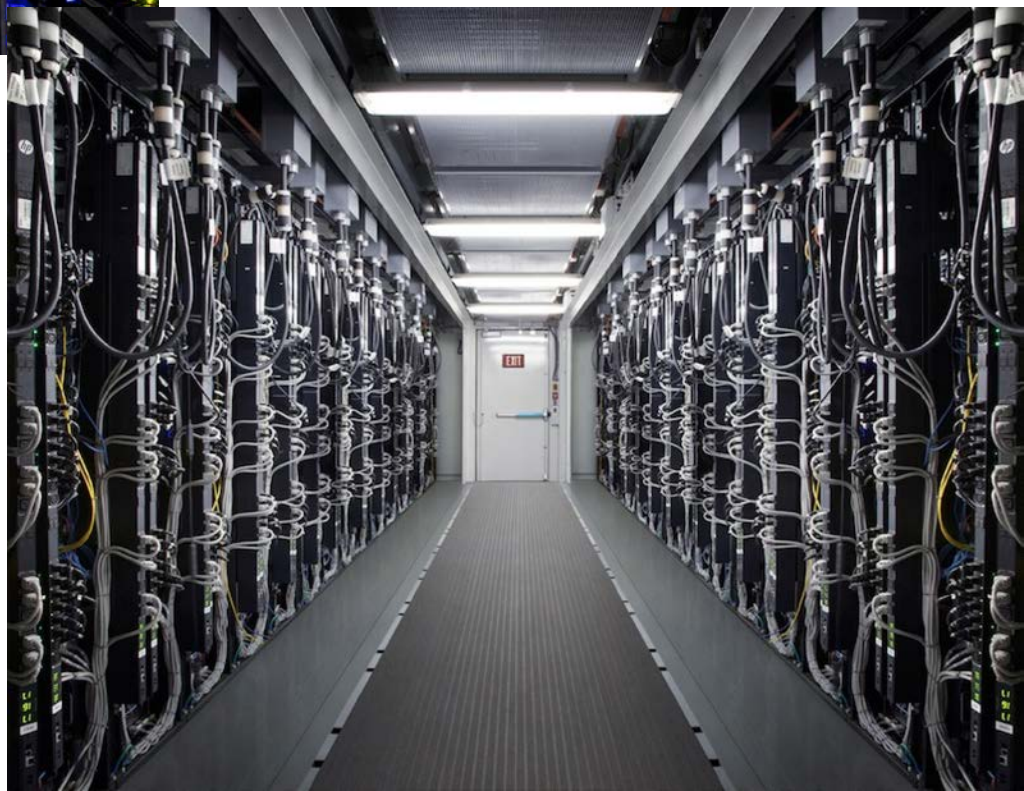
Session 36

INST 346

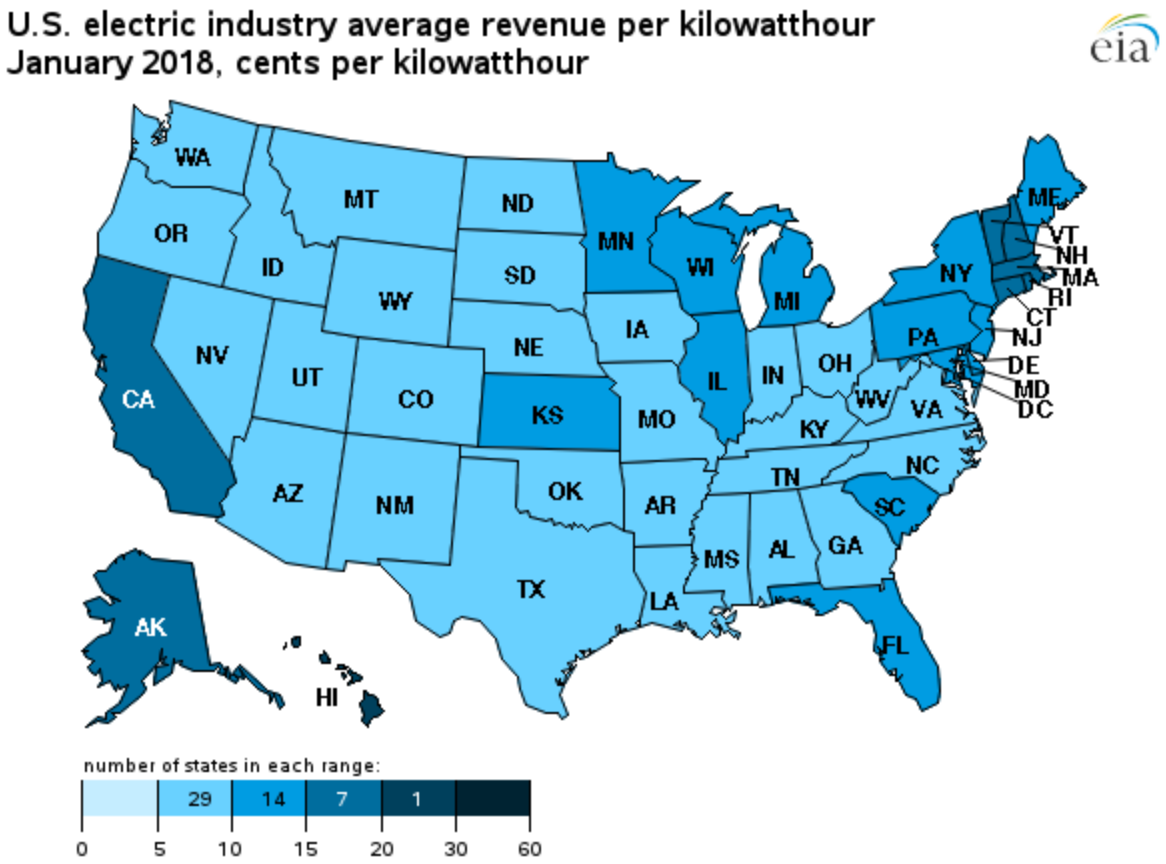
Technologies, Infrastructure and Architecture

Facebook Data Center, Dallas

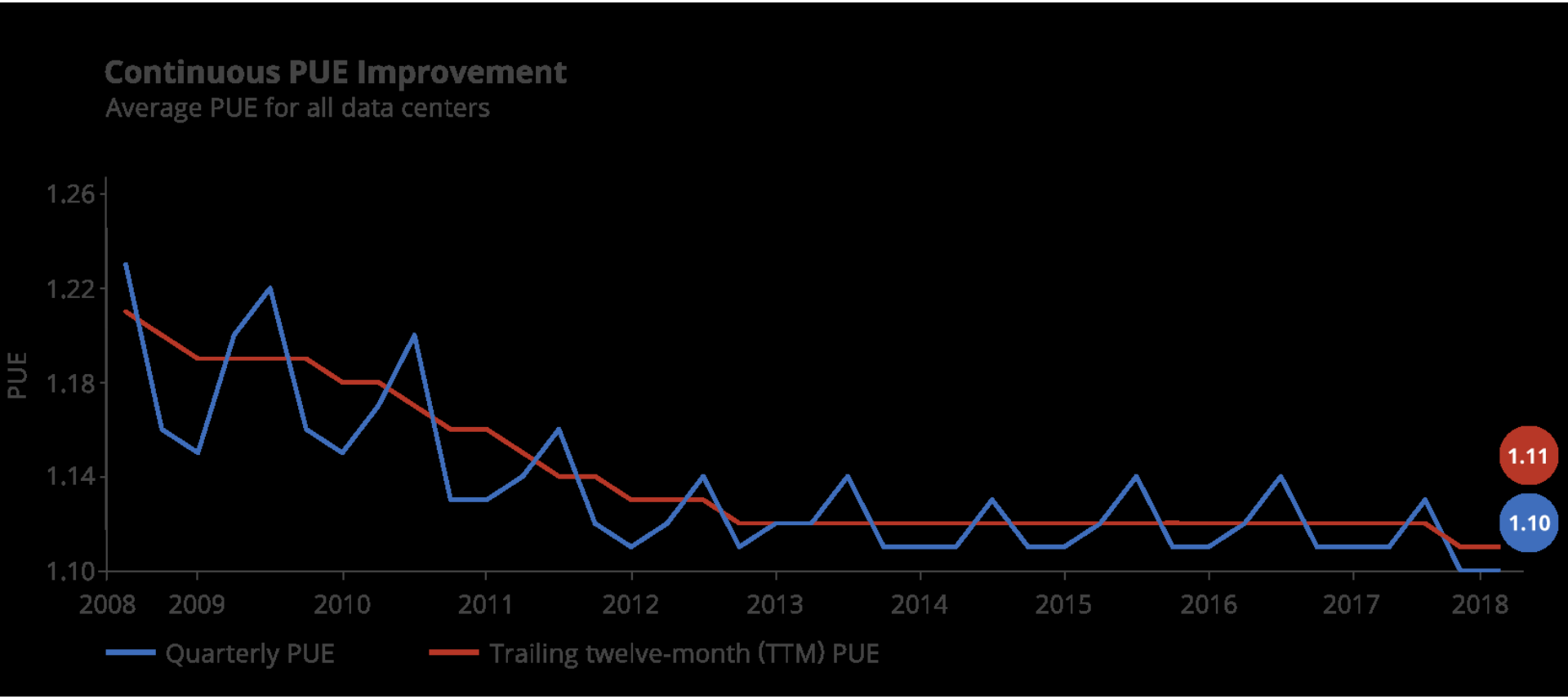

Google


EXIT

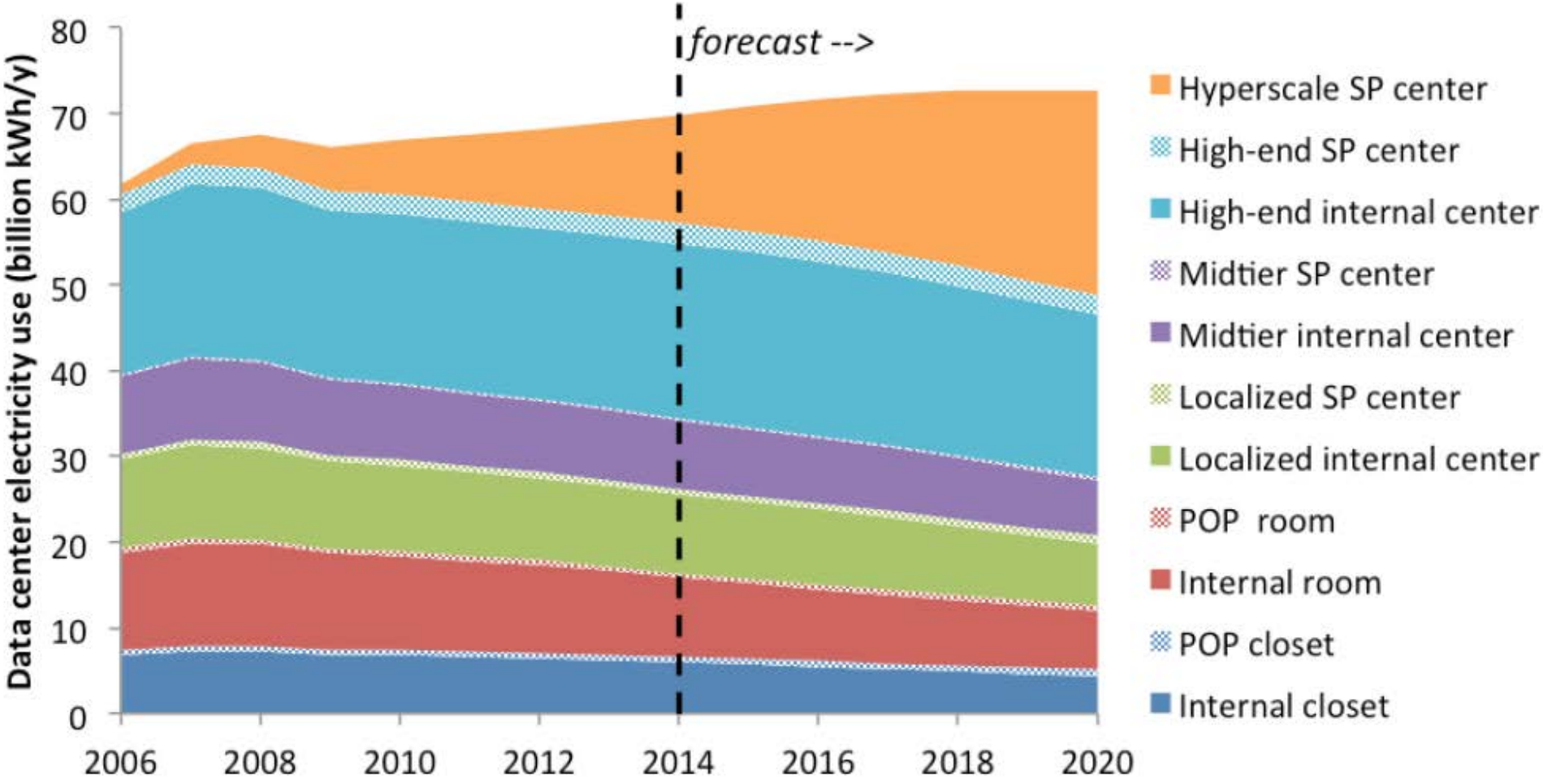
Electricity Costs



Power Use Efficiency



Electricity Use



Data center locations

We own and operate data centers around the world to keep our products running 24 hours a day, 7 days a week. Find out more about our data center locations, community involvement, and job opportunities in our locations around the world.

Americas

Berkeley County, South Carolina
Council Bluffs, Iowa
Douglas County, Georgia
Jackson County, Alabama
Lenoir, North Carolina
Mayes County, Oklahoma
Montgomery County, Tennessee
Quilicura, Chile
The Dalles, Oregon

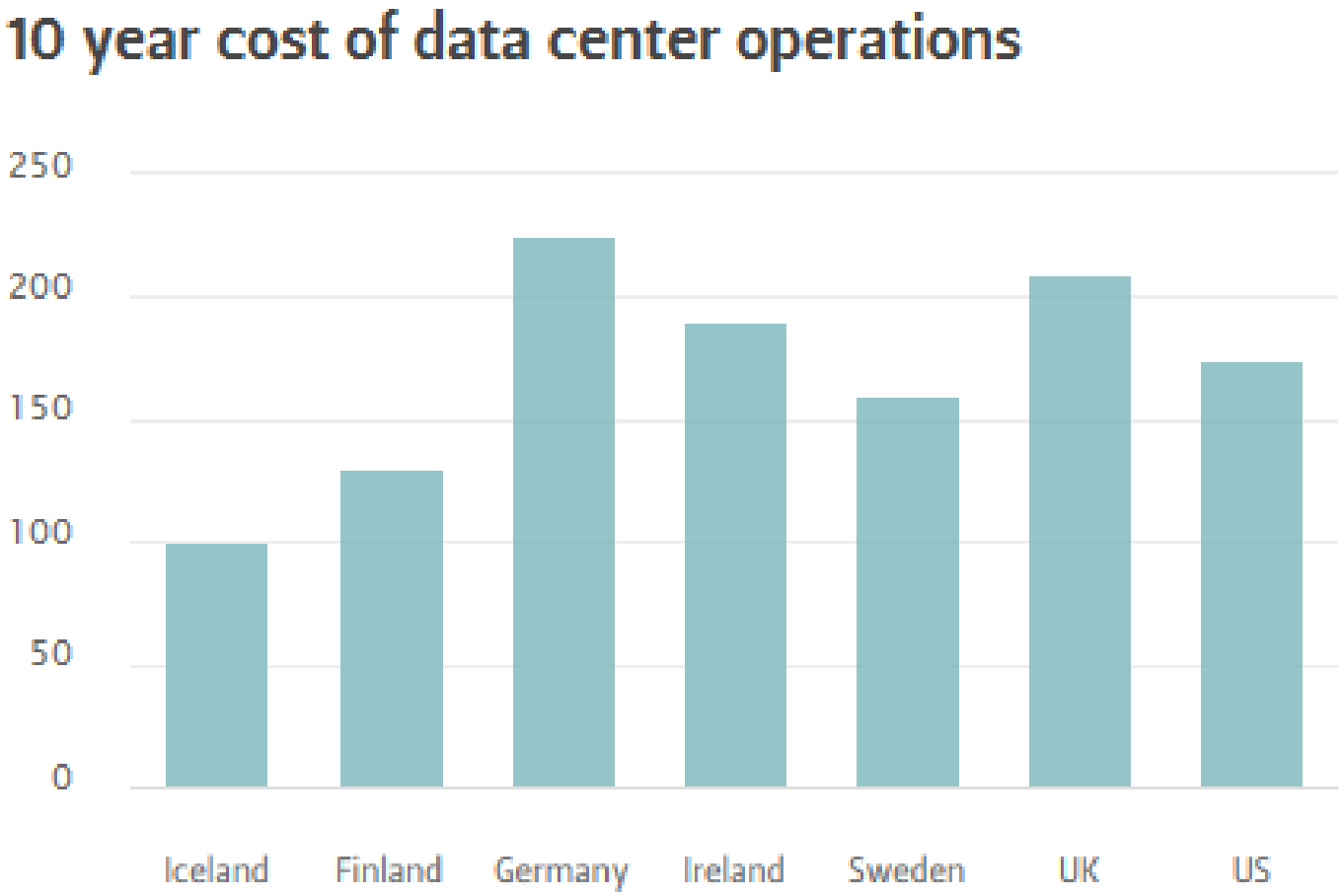
Asia

Changhua County, Taiwan
Singapore

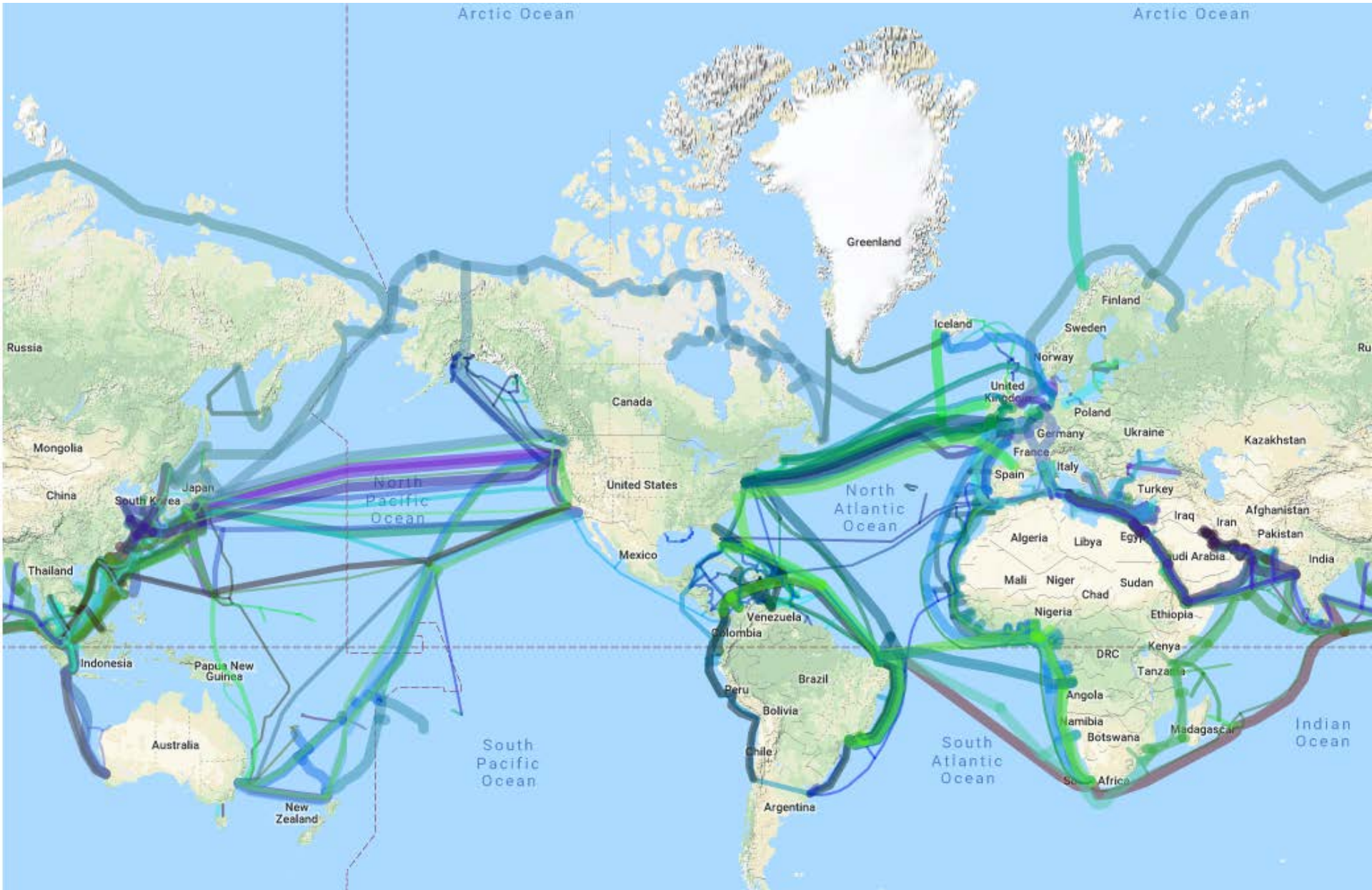
Europe

Dublin, Ireland
Eemshaven, Netherlands
Hamina, Finland
St Ghislain, Belgium

Total Cost of Ownership



“Submarine” Fiber Optic Cables

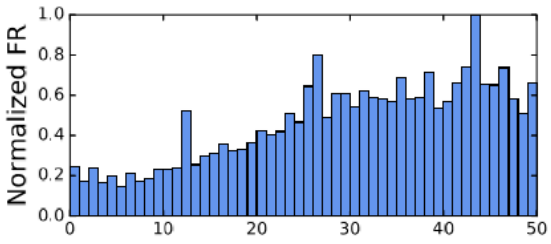


Design for Failure

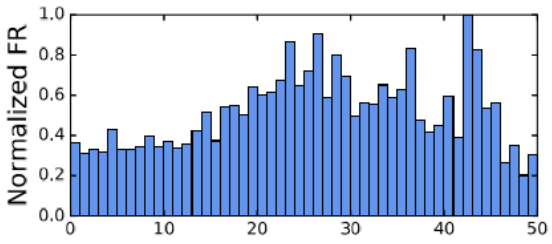
In each [1,800-server] cluster's first year, it's typical that 1,000 individual machine failures will occur; thousands of hard drive failures will occur; one power distribution unit will fail, bringing down 500 to 1,000 machines for about 6 hours; 20 racks will fail, each time causing 40 to 80 machines to vanish from the network; 5 racks will "go wonky," with half their network packets missing in action; and the cluster will have to be rewired once, affecting 5 percent of the machines at any given moment over a 2-day span, Dean said. And there's about a 50 percent chance that the cluster will overheat, taking down most of the servers in less than 5 minutes and taking 1 to 2 days to recover.

Google, 2008

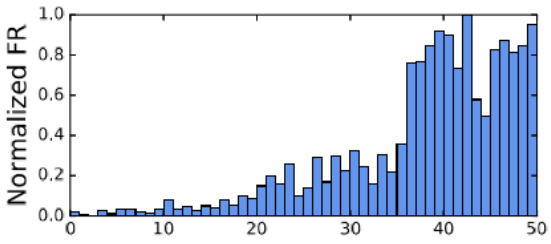
Failure Rates



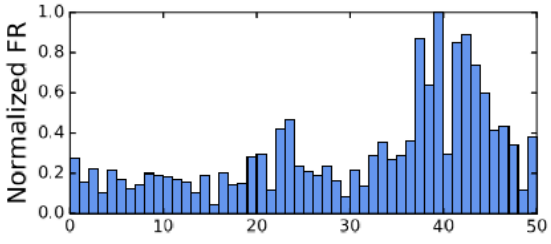
(a) HDD



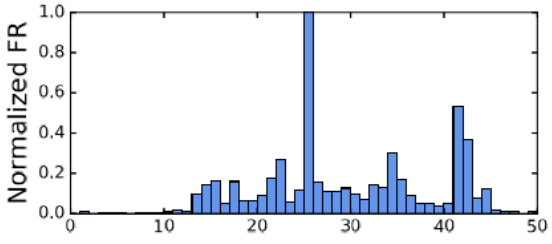
(b) Memory



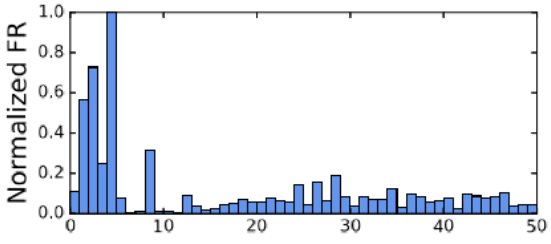
(c) Motherboard



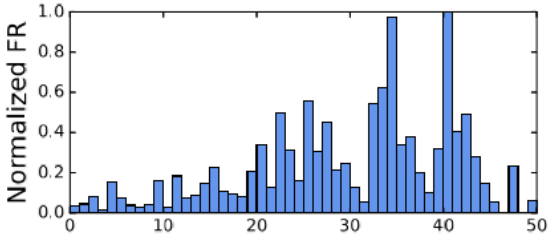
(d) SSD



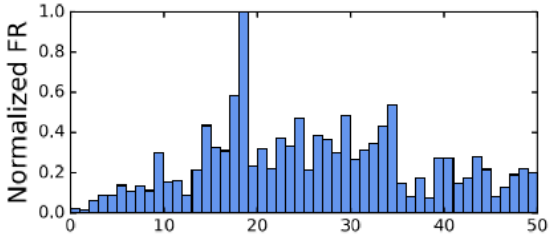
(e) Flash card



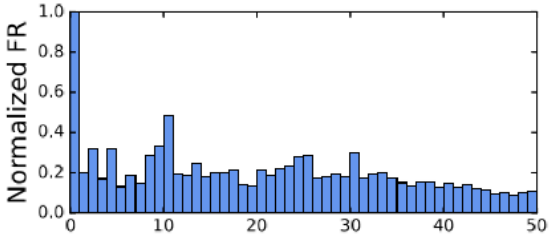
(f) Raid Card



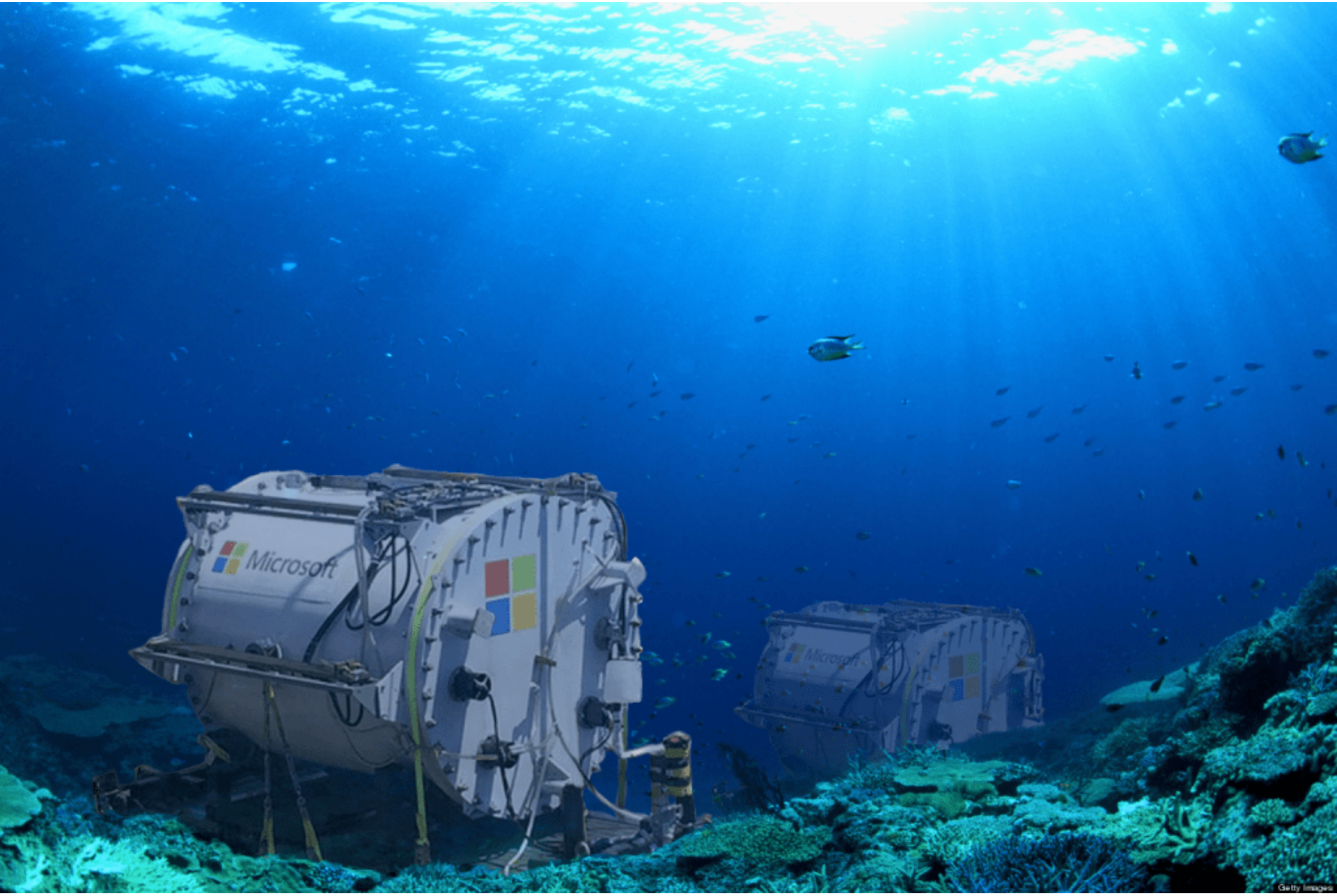
(g) Fan



(h) Power



(i) Miscellaneous


Microsoft
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Getty Images