The Future of File Systems

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The “Absurd” 10x (=4 year) Disk

• 2.5 hr scan time
  (poor sequential access)
• 1 aps / 5 GB
  (VERY cold data)
• It’s a tape!

Slide from Jim Gray’s “Rules of Thumb in Data Engineering” talk, 7 May 2002.
Was Jim Wrong?

• No: The technology changed in much the way that he expected.
• No: Those changes mean that you can’t use a 2TB disk today the same way that you used a 100GB disk in 2002, just like he predicted.
• Yes: We found applications for the disks that weren’t the same as tape applications back then. The objects just got bigger, so you get Maps instead of Kaps.
So What Happened?

• The same thing that happens with technology pretty much all the time:
  – Underlying technologies change based on advances in science and engineering
  – Someone figures out how to use the new technologies to make something useful

• Technological change drives features, not the other way around (usually)
  – Invention is the Mother of Necessity, at least for consumer products.
So, What’s the New Tech?

• More of the same in disks: They’ll come preloaded since disk size/home net BW (10TB/3 Mb/s ~= 1 year).

• Flash in more devices, still has a lifetime problem for enterprises. Basically low power, high cost disk with great read IOP/s.

• PCM is a game changer: not a block device means file system API is wrong.