

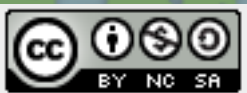
UbiComp In The Clouds: Observations, Reflections and Experiences

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INF 241

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<http://www.ics.uci.edu/~djp3>

: My Background


- B.S., Computer Science from Cornell (NY)
 - M.Eng, Electrical Engineering
- STRIKE Officer
 - USS CURTIS WILBUR, DDG-54, Japan
- Operations Officer
 - USS SIMON LAKE, AS-33, Italy
- Ph.D in Computer Science and Engineering at UW
- Director of the Laboratory for Ubiquitous Computing and Interaction
- Co-founder of quub, whisper.fm, swayr



: What is Ubiquitous Computing?



: What is Ubiquitous Computing?


ubiq·ui·tous  *adj* \yü-'bi-kwə-təs\

Definition of UBIQUITOUS



: existing or being everywhere at the same time : constantly encountered : WIDESPREAD <a *ubiquitous* fashion>

- ubiq·ui·tous·ly *adverb*
- ubiq·ui·tous·ness *noun*

 See [ubiquitous](#) defined for English-language learners »
See [ubiquitous](#) defined for kids »

Examples of UBIQUITOUS

- The company's advertisements are *ubiquitous*.
- <by that time cell phones had become *ubiquitous*, and people had long ceased to be impressed by the sight of one>
- Hot dogs are the ideal road trip food—inexpensive, portable, *ubiquitous*. —Paul Lucas, *Saveur*, June/July 2008

[+] more

www.merriam-webster.com

: The origins of Ubicomp as a academic discipline

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The Computer for the 21st Century

Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence

by Mark Weiser

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

Consider writing, perhaps the first information technology. The ability to represent spoken language symbolically for long-term storage freed information from the limits of individual memory. Today this technology is ubiquitous in industrialized countries. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, shop signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "literacy technology" does not require active attention, but the information to be transmitted is ready for use at a glance. It is difficult to imagine modern life otherwise.

Silicon-based information technology, in contrast, is far from having become part of the environment. More than 50 million personal computers have been sold, and the computer nonetheless remains largely in a world of its own. It

is approachable only through complex jargon that has nothing to do with the tasks for which people use computers. The state of the art is perhaps analogous to the period when scribes had to know as much about making ink or baking clay as they did about writing.

The arcane aura that surrounds personal computers is not just a "user interface" problem. My colleagues and I at the Xerox Palo Alto Research Center think that the idea of a "personal" computer itself is misplaced and that the vision of laptop machines, dynabooks and "knowledge navigators" is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of people's lives. We are therefore trying to conceive a new way of thinking about computers, one that takes into account the human world and allows the computers themselves to vanish into the background.

Such a disappearance is a fundamental consequence not of technology but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientist, economist and Nobelist Herbert A. Simon calls this phenomenon "compiling"; philosopher Michael Polanyi calls it the "tacit dimension"; psychologist J. J. Gibson calls it "visual invariants"; philosophers Hans Georg Gadamer and Martin Heidegger call it the "horizon" and the "ready-to-hand"; John Seely Brown of PARC calls it the "periphery." All say, in essence, that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals.

The idea of integrating computers seamlessly into the world at large runs counter to a number of present-day trends. "Ubiquitous computing" in this context does not mean just computers that can be carried to the beach, jungle or airport. Even the most powerful notebook computer, with access to a worldwide information network, still focuses attention on a single box. By analogy with writing, carrying a superlaptop is like owning just one very important book. Customizing this book, even writing millions of other books, does not begin to capture the real power of literacy.

Furthermore, although ubiquitous computers may use sound and video in addition to text and graphics, that does not make them "multimedia computers." Today's multimedia machine makes the computer screen into a demanding focus of attention rather than allowing it to fade into the background.

Perhaps most diametrically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. Users don special goggles that project an artificial scene onto their eyes; they wear gloves or even bodysuits that sense their motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore realms otherwise inaccessible—the insides of cells, the surfaces of distant planets, the information web of data bases—virtual reality is only a map, not a territory. It excludes desks, offices, other people not wearing goggles and bodysuits, weather, trees, walks, chance encounters and, in general, the infinite richness of the universe. Virtual reality focuses an enormous apparatus on simulating the world rather than on invisibly enhancing the world that already exists. Indeed, the opposition between the



UBIQUITOUS COMPUTING begins to emerge in the form of live boards that replace chalkboards as well as in other devices at the Xerox Palo Alto Research Center. Computer scientists gather around a live board for discussion. Building boards

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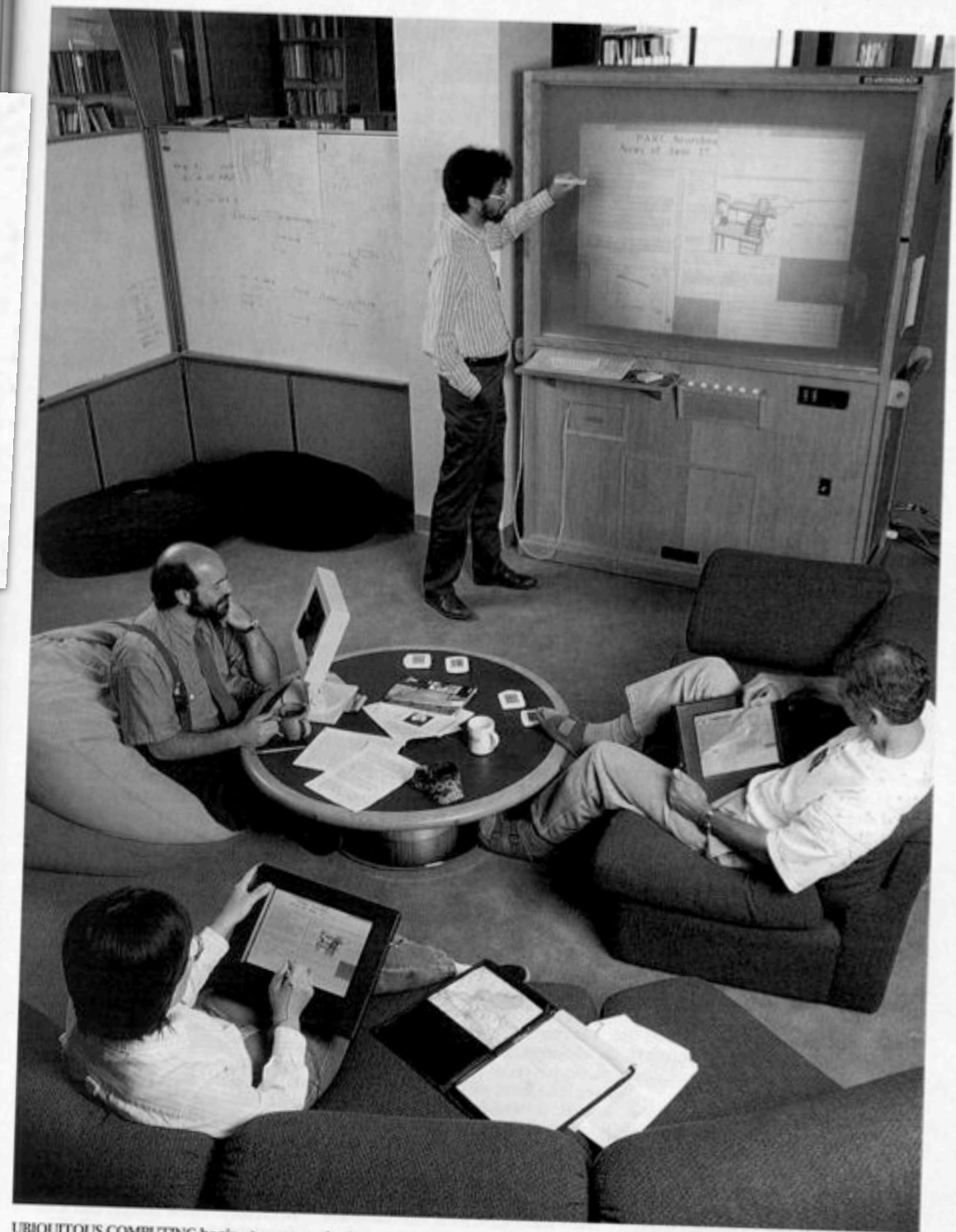
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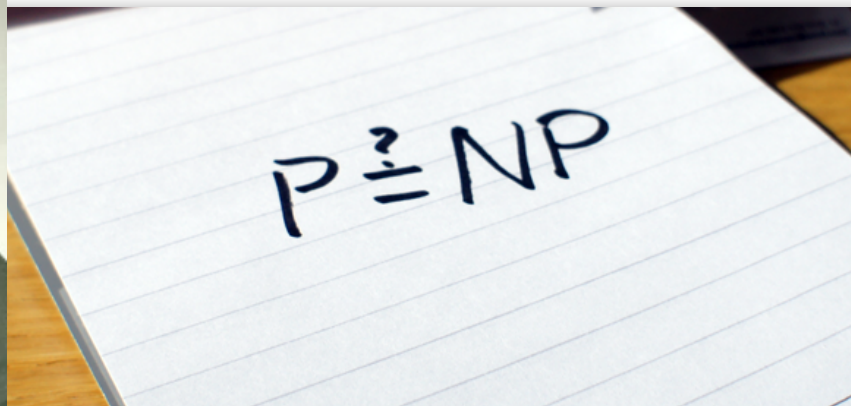
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Zero Wave

- Computerless Computing
 - 1930-1940
 - Computers are theoretical technology
 - Church and Turing establish fundamental limits on computability





First Wave

- Main Frame Computing
 - 1960-1970
 - Massive computers to do simple data processing
 - Few computers in the world





Second Wave

- Desktop Computing
 - 1980-1990
 - Business applications drive usage
 - One computer per desk
 - Computers connected in intranets to a massive global network
 - All wired





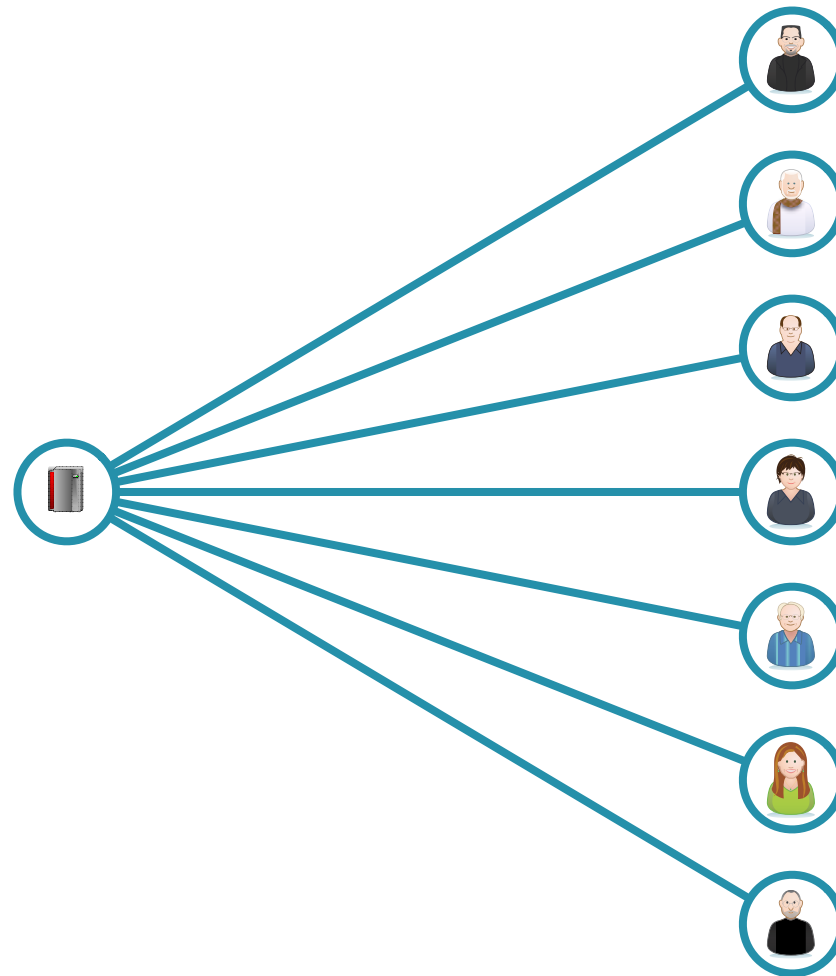
Third Wave

- Ubiquitous Computing
 - 2000 - present
 - Information creation, access, communication drive usage
 - Multiple computers per environment/person
 - WANs, LANs, PANs, ad-hoc networking, wireless
 - Computers disappearing



: Ubicomp is about people's relationship to computers

First Wave



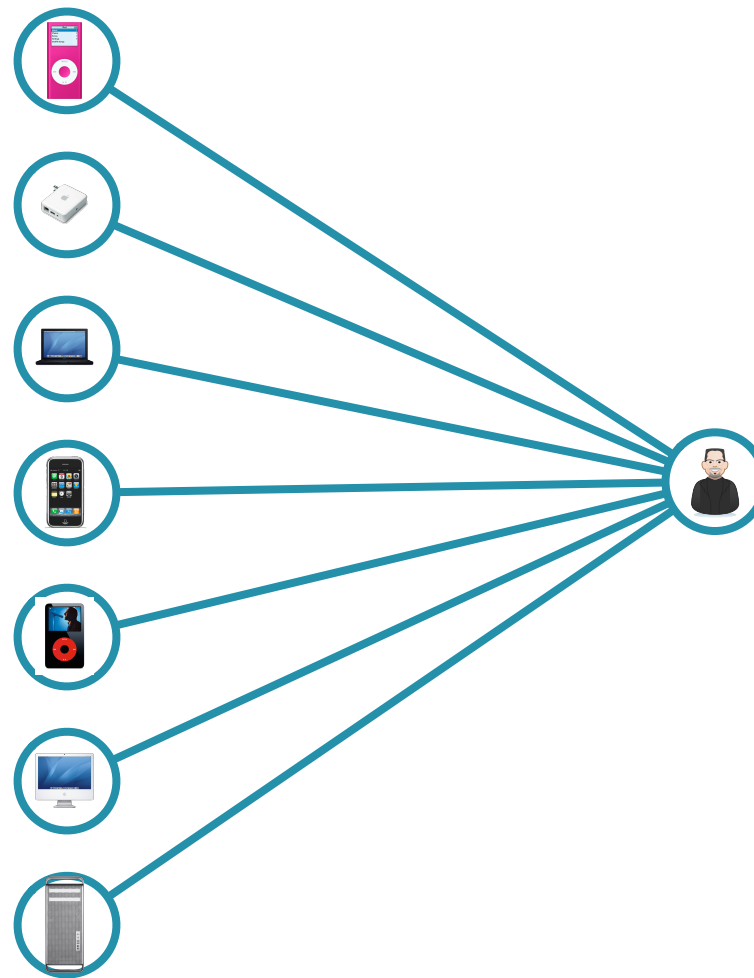
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Second Wave



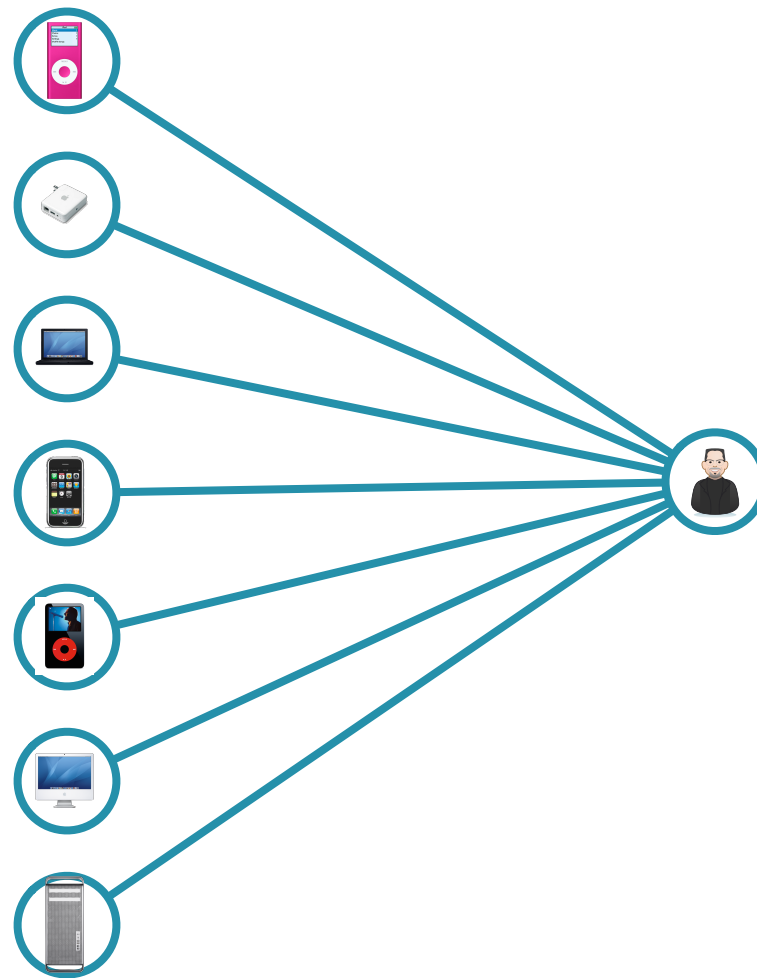
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Third Wave



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Third Wave



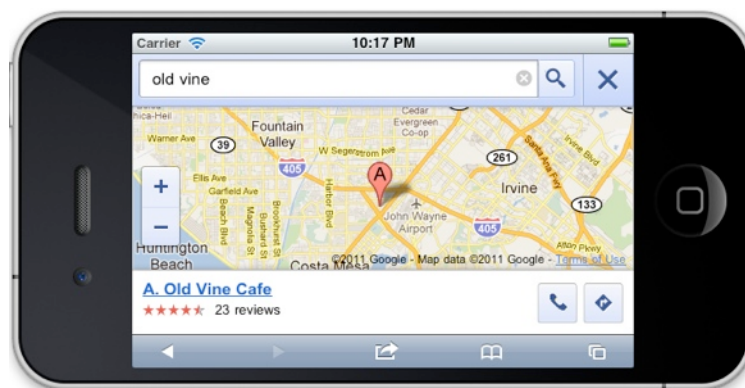
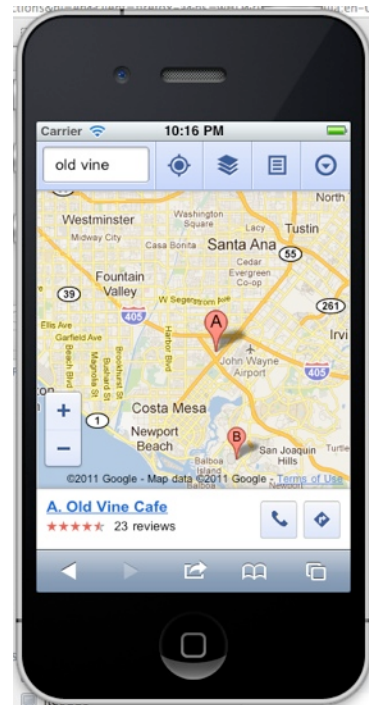
How are we going to manage all of these devices?

: Ubicomp is about people's relationship to computers

Ubicomp ————— Augmented Reality ————— Virtual Reality

Virtual Worlds

Mirror Worlds

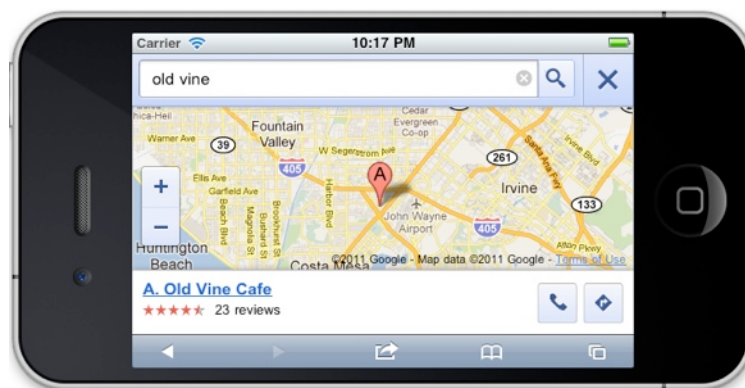
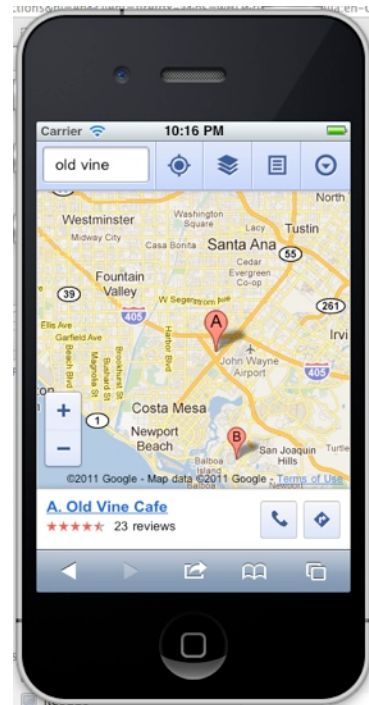


: Ubicomp is about people's relationship to computers

Ubicomp ————— Augmented Reality ————— Virtual Reality

Virtual Worlds

Mirror Worlds



ar photo, vr photo, green photo

Ubicomp is about people's relationship to computers

- virtual reality
 - humans enter the computers world
- ubiquitous computing
 - computers enter the human's world

Who is going to manage all of these devices?

Who is going to manage the infrastructure when the computers enter the human's world?

Who is going to manage all of these devices?

Who is going to manage the infrastructure when the computers enter the human's world?

The professionals!

Who is going to manage all of these devices?

Who is going to manage the infrastructure when the computers enter the human's world?

The professionals!

Enter cloud computing....

Cloud computing

is several

{visions, architectures, infrastructures}

that transform computing from a

{capital investment, product}

into a

{utility, service}

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Why now? What has changed?

- Connectivity
- Smart phones
- System Virtualization
- Security Threats
- Sentient browser applications

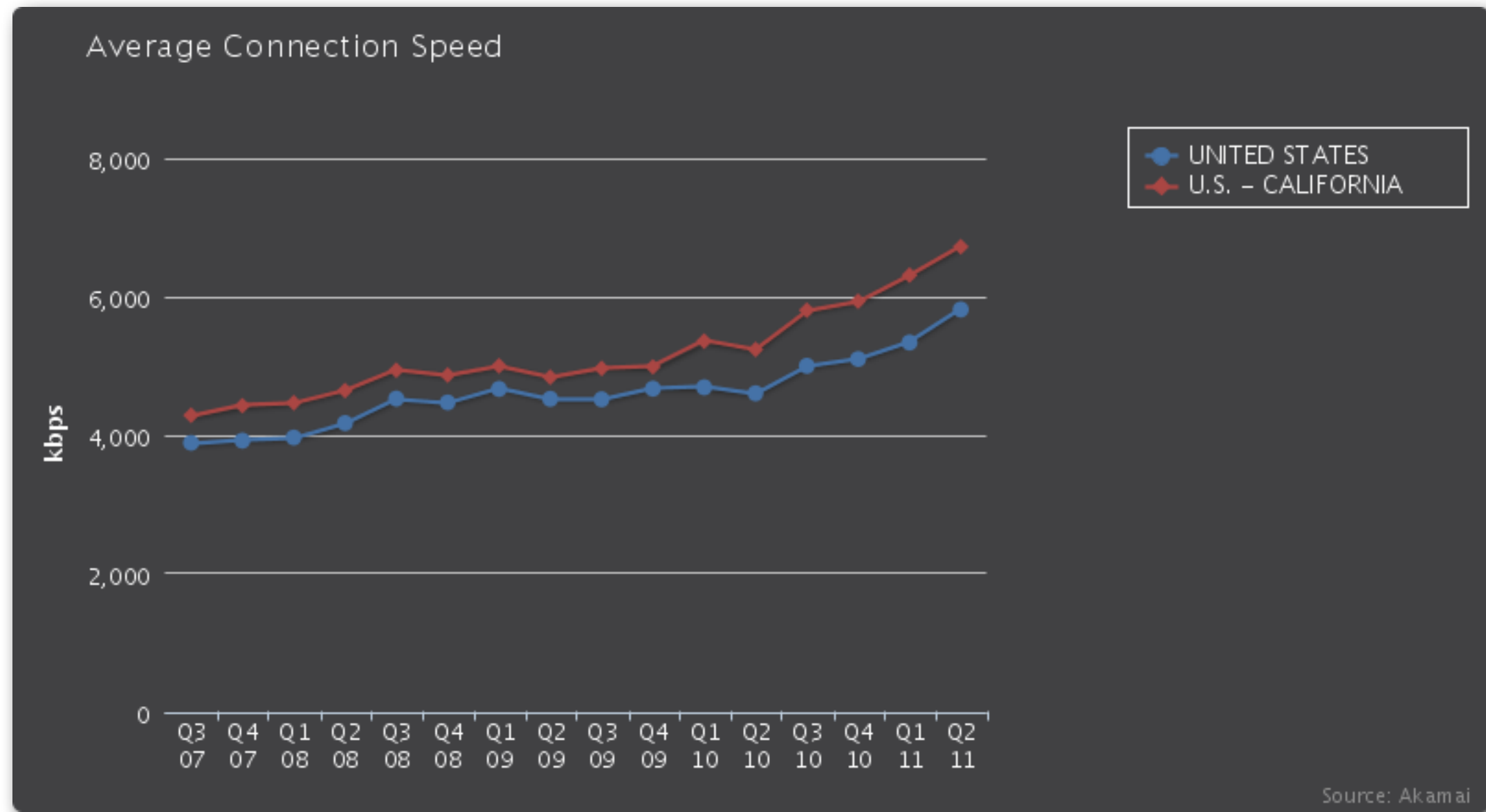


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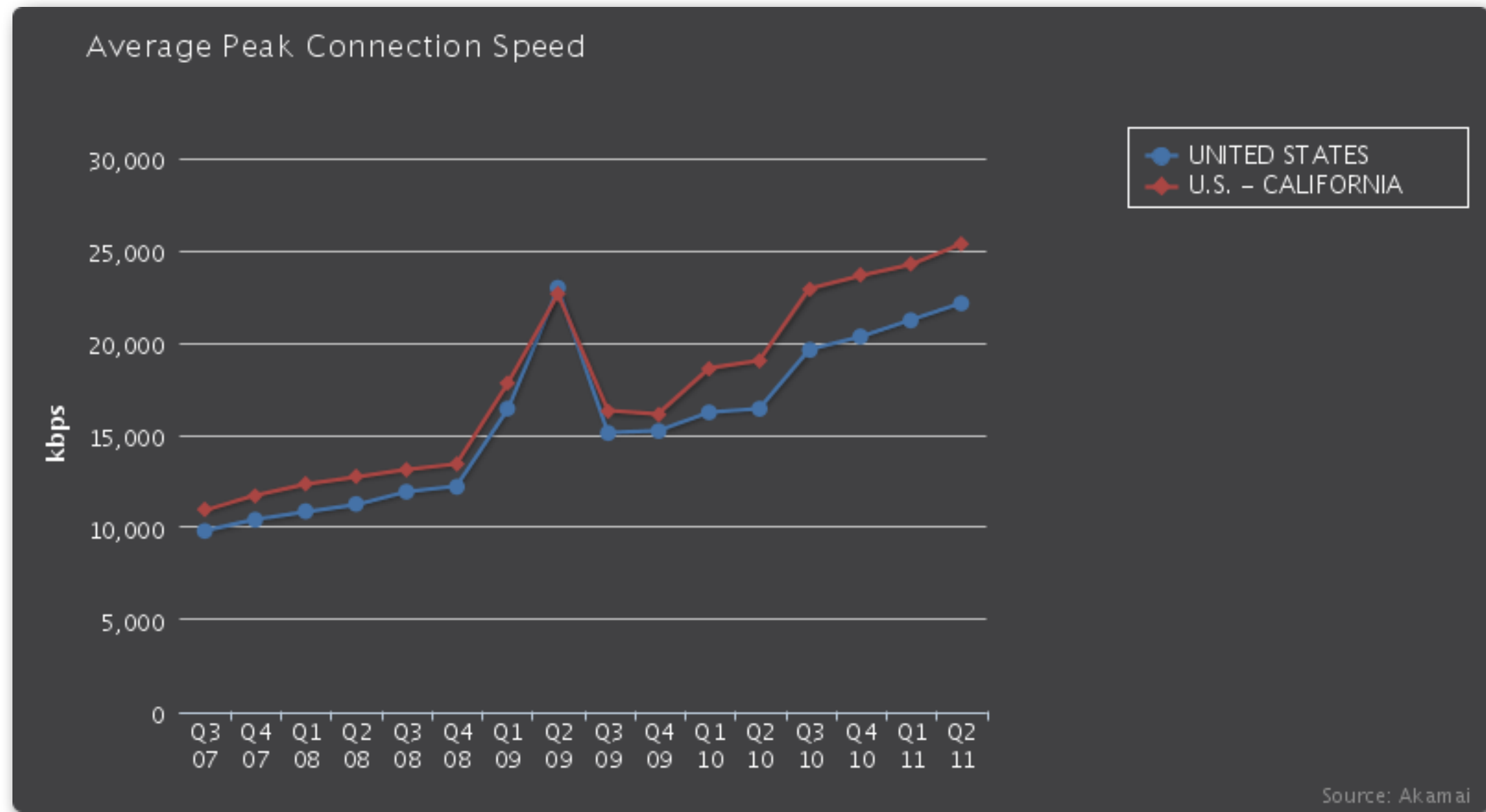
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Connectivity



Connectivity



Which country has the fastest mobile broadband?

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Greece
(5.3 mbps average)

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Austria

(23.4 mbps highest average peak connection speed)

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“average connection speeds increased by more than 100% year-over-year at 22 mobile providers”

-akamai

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The mobile penetration divide

In some parts of Africa, five people share the same phone. In Italy, almost every adult has at least two mobile devices. How penetration varies by region, data represents the average number of people per SIM card subscription in 2010¹.

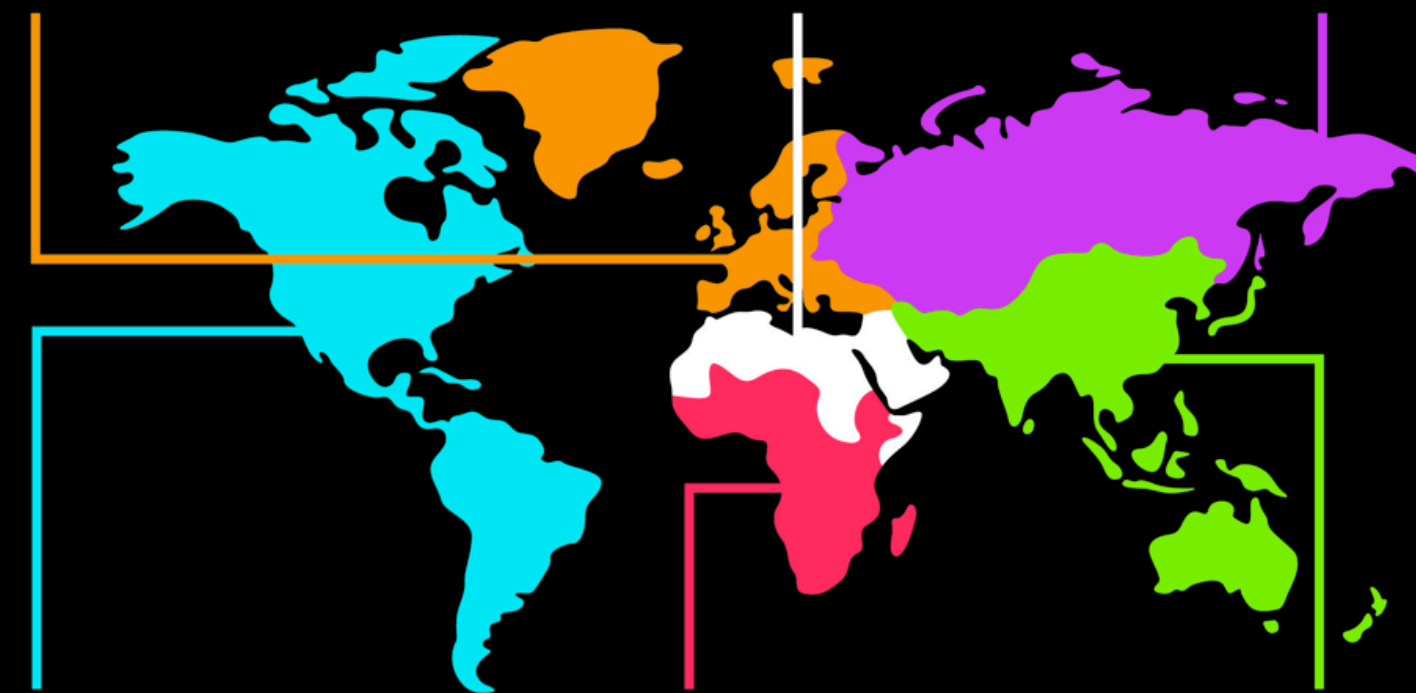
Europe: 0.8



Arab States: 1.3



CIS²: 0.8



The Americas: 1.1



Africa: 2.4



Asia & Pacific: 1.5

blog.nokia.com

SOURCE: International Telecommunications Union (<http://www.itu.int>)
Notes: 1. Estimate 2. Commonwealth of Independent States

Nokia Conversations
The Official Nokia Blog



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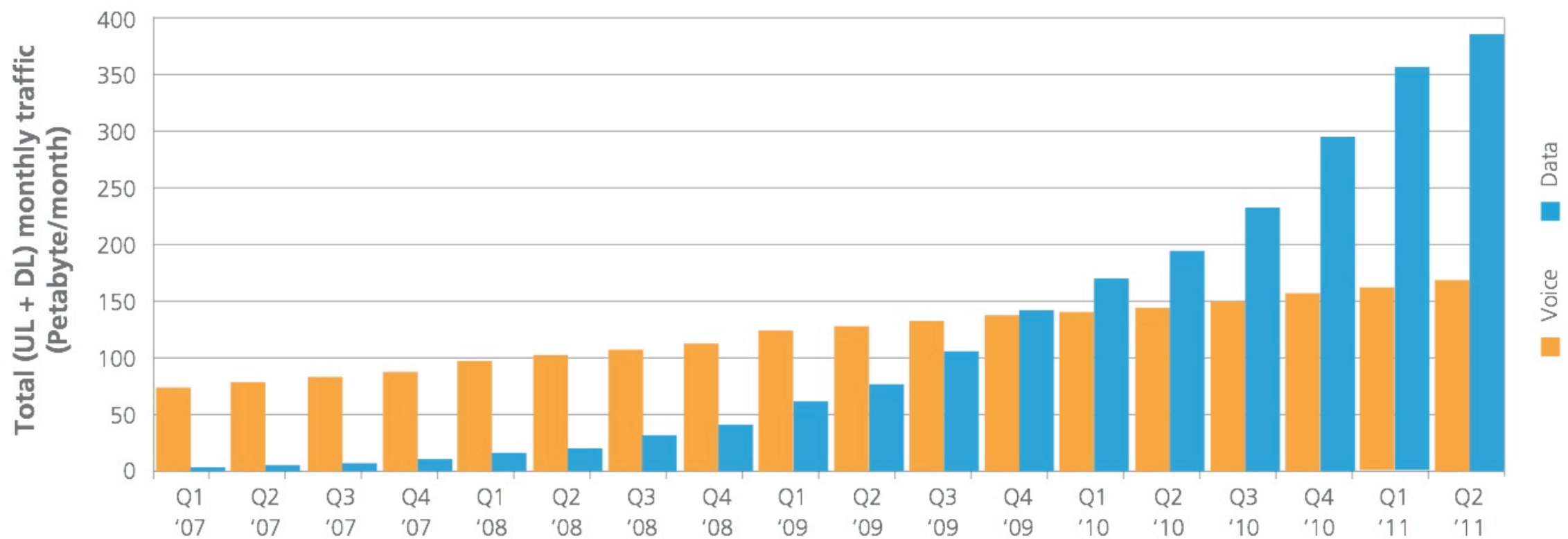


Figure 40: Total Monthly Mobile Voice and Data as Measured by Ericsson [Source: Ericsson]

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Virtualization Technology



Windows 7 Running in a
Virtual Machine on a Mac

Virtualization Technology

Commercial



Open Source



Powers Amazon,
Rackspace, Linode, etc.

What is virtualization good for?

- Efficiency
 - Fully utilize “bare-metal” host hardware
 - Suddenly 8 cores seems reasonable
- Portability
 - Move a virtual machine to another host
 - Perhaps without telling anyone
- Isolation
 - One machine doesn't effect another
- Run multiple OS's at the same time
- Supports disposal computers

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Security Threats

Security Threats





- Pros

- Nation states
- Very smart people
- Unlimited Resources
- Motivated by political/military goals

- Semi-pros

- Organized crime
- Motivated by money

- Amateurs

- Motivated by bragging rights



China, U.S., Israel

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Anonymous,
LulzSec

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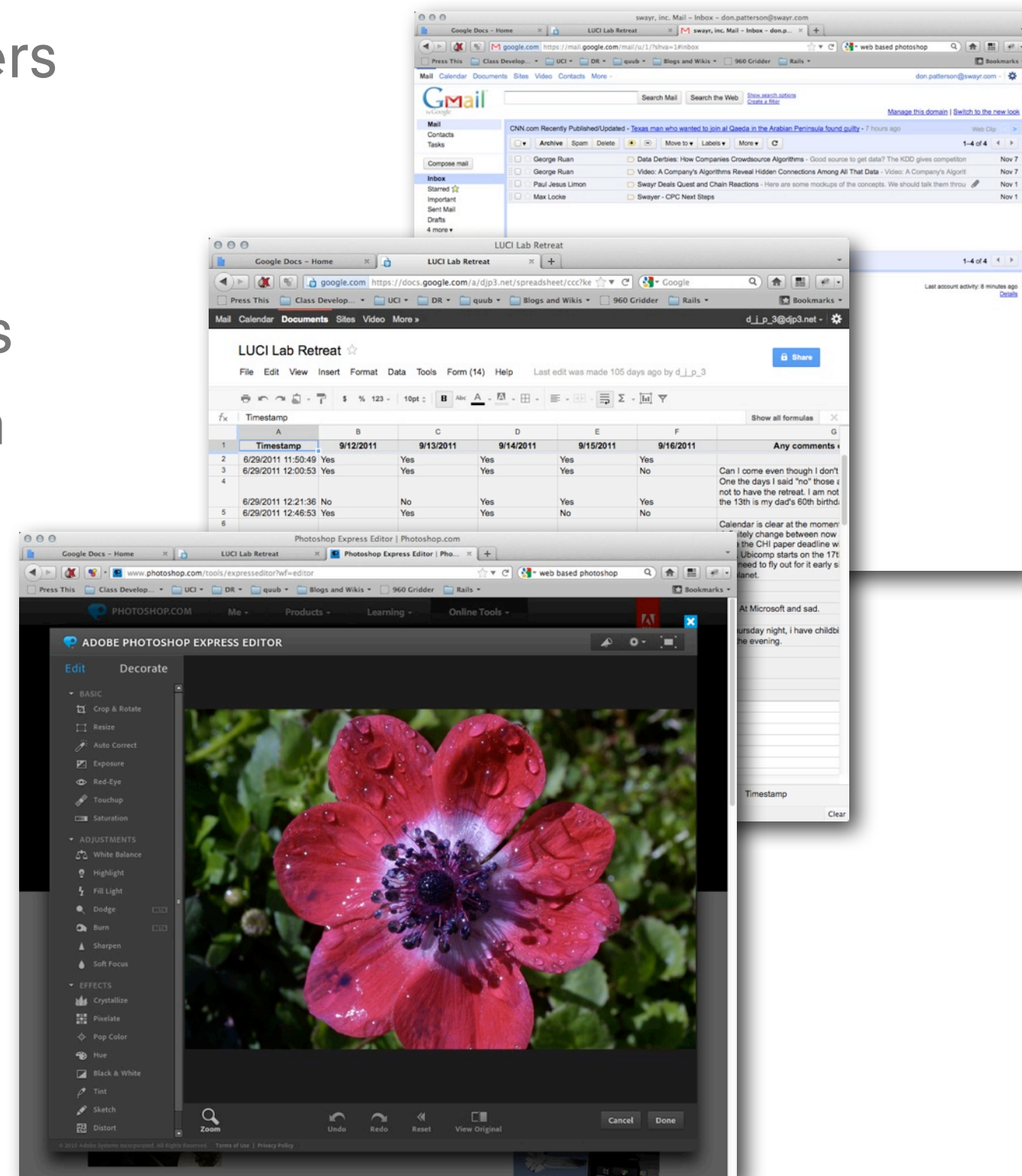
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Sentient browser applications

- Sentient Applications
 - Programs that people spend time working with
- Enabled by modern browsers
 - Offline storage
 - Web sockets
 - Real-time push updates
 - Real-time collaboration
 - Fast client-side Javascript
- Examples
 - Hotmail
 - Google Docs
 - Photoshop Express



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So, now the landscape has changed



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I can always reach any computer in the world at high-speed wirelessly

So, now the landscape has changed



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I have a device in my pocket that can be a decent interface to any other computer in the world

So, now the landscape has changed



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It is very cheap to run powerful computers in consolidated data centers

So, now the landscape has changed



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It requires professionals to keep computers and data secure when being attacked by sophisticated enemies

So, now the landscape has changed



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I don't need to be able to run a program natively. I'd rather run the latest program released every day.

So, now the landscape has changed



Why now? What has changed?

- First wave
 - It was cheaper to share a mainframe
- Second wave
 - It was cheaper to have your own desktop
- Third wave
 - It is cheaper to rent computation from the cloud



What are the visions?

- **Consumer**
 - Don't think about the cloud
- **Services**
 - Always available apps
- **Infrastructure**
 - Build with our tech services
 - Virtual Machines
 - Rent a cloud computer

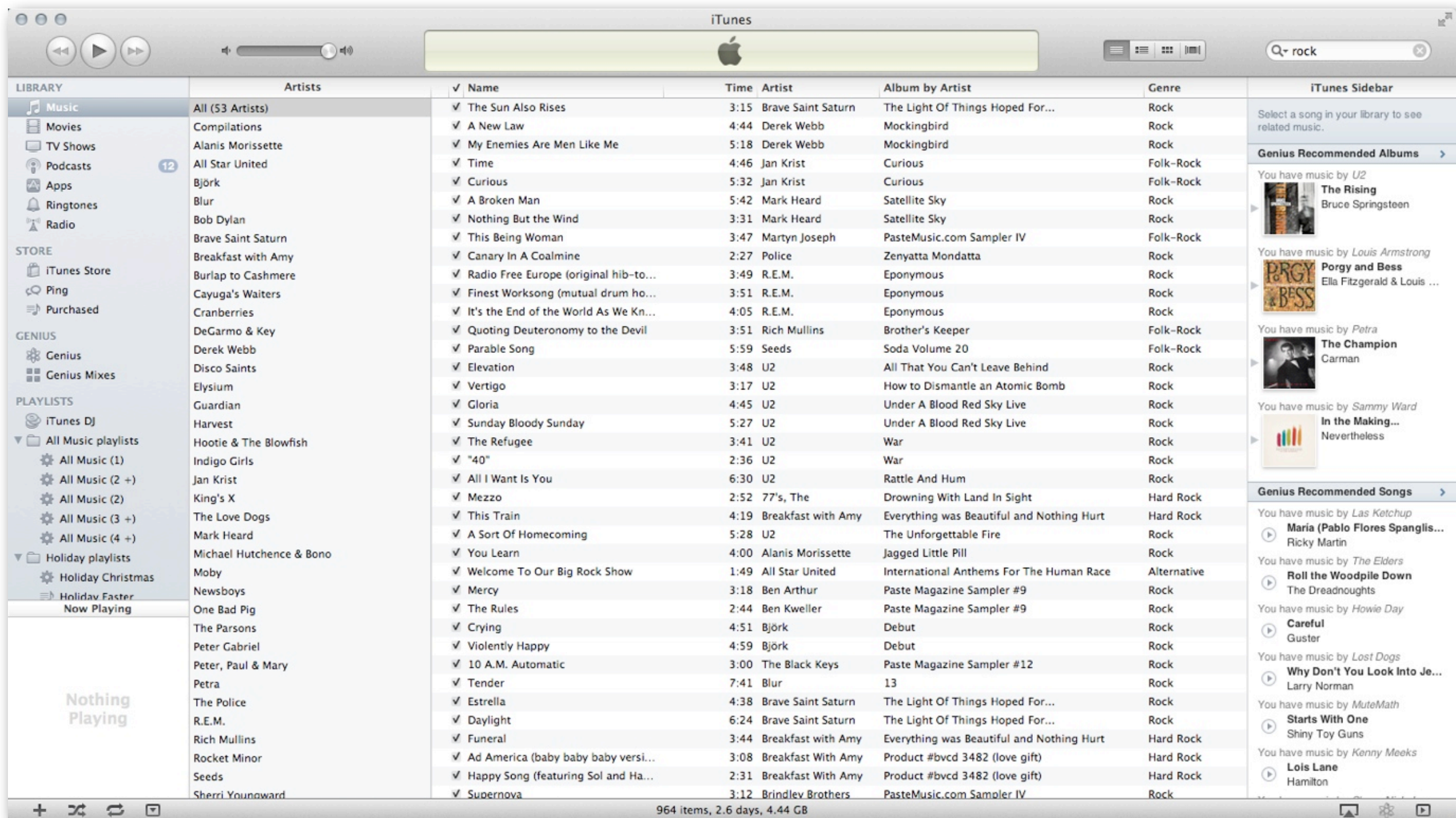


What are the visions?

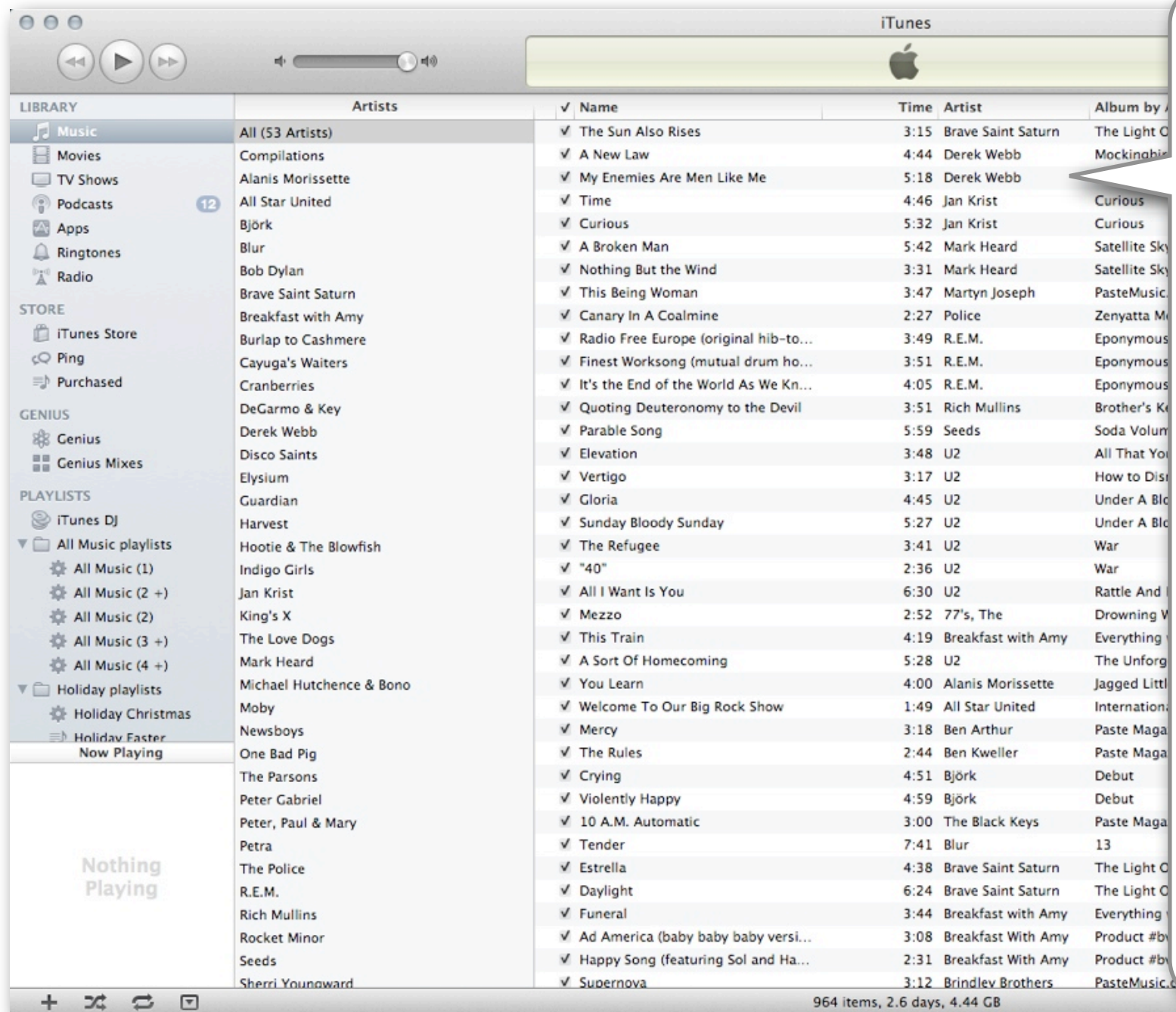
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Consumer vision : iTunes Match



Consumer vision : iTunes Match



Your music, movies, television are always there on every Apple device.

Consumers don't know how it gets there.

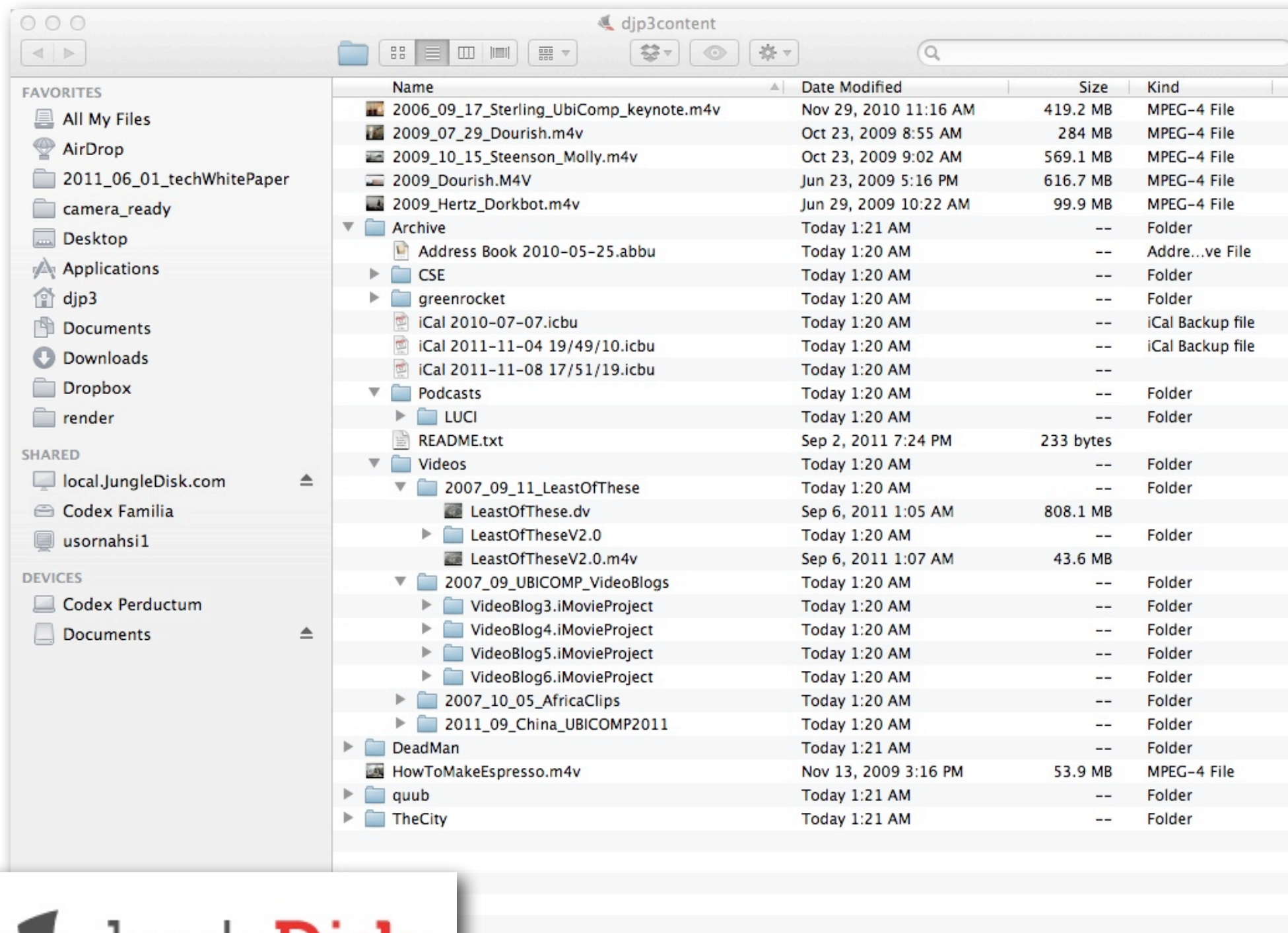
(It is all backed by an Apple data center)

And now that it is in the cloud there is no more syncing, no more worrying about disk space, no more worrying about back ups.

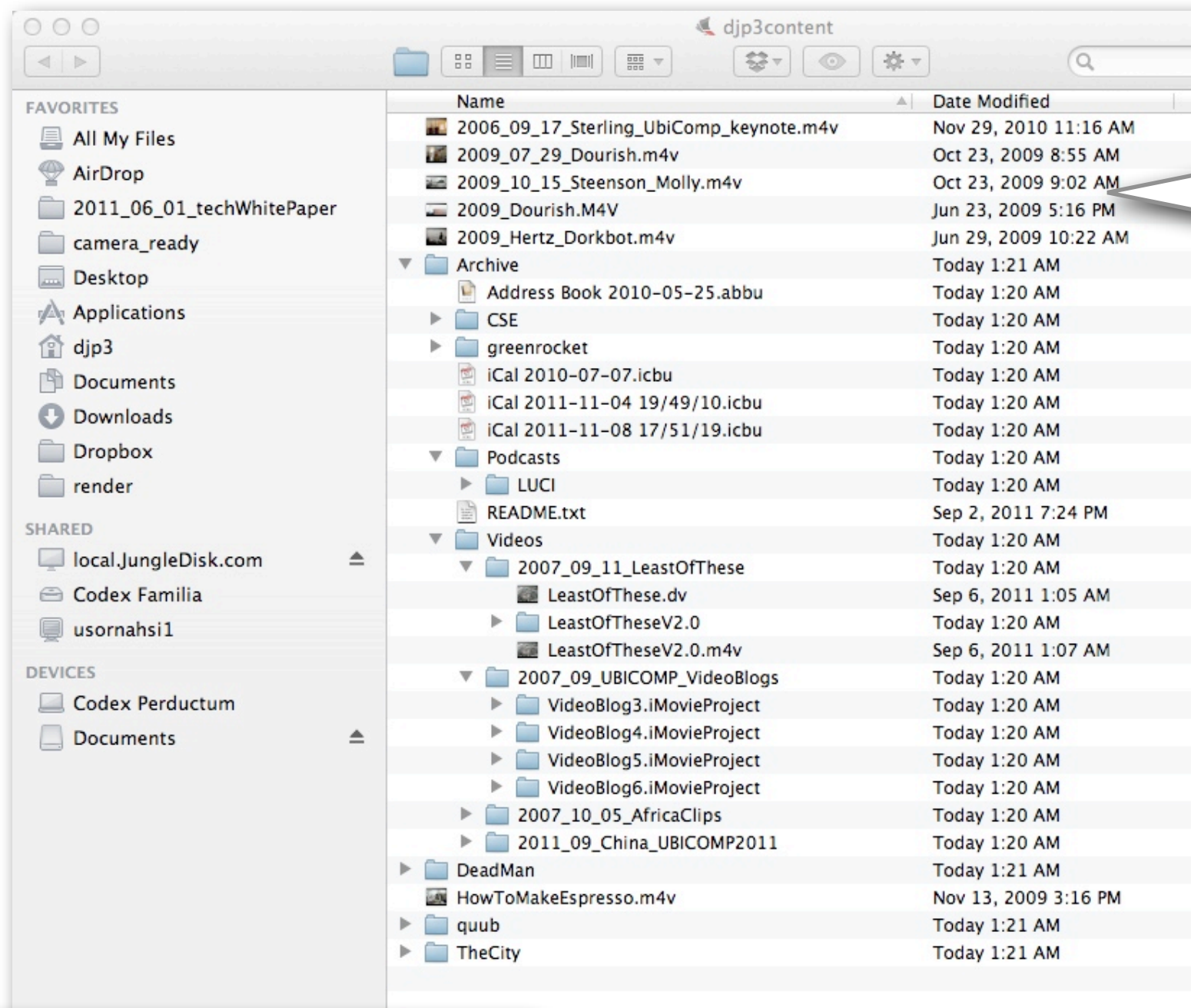
\$25.00 a year



Consumer vision : JungleDisk



Consumer vision : JungleDisk



An infinitely large hard-drive
that never crashes

Consumers don't know where
the data is kept.

(It is all backed by an Amazon
data center)

Any data that you need is
available on demand. Caching
supports fast access

\$0.14 GB/month + txfr



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 - Rent a cloud computer



Services vision : Google Apps

The screenshot shows the Google Apps dashboard for the domain djp3.net. The browser window has multiple tabs open, including Amazon Simple Storage Service, Jungle Disk, and a Gmail account for Donald J. Patterson III. The dashboard header includes the Google Apps logo, a search bar, and the user's email address with links to Inbox, Calendar, Help, and Sign out. A navigation menu contains links to Dashboard, Organization & users, Groups, Domain settings, Reports, Advanced tools, Setup, Support, Settings, and Help.

Add Chromebooks to your Google Apps domain.
Fast, intuitive, and easy-to-manage laptops. Chromebooks are designed to protect data and users while increasing user productivity and dramatically reducing total cost of ownership. [Learn more](#)

Over the next few months, Google Apps is getting a new look and feel! [Learn more](#)

Donald J. Patterson III
djp3.net
[Manage account information](#) [domain names](#)
[3 users](#)
You have reached the 3 user limit for this organization.

✓ All Google Apps services are running smoothly. [Learn more](#)

Seven-day active users over the last 90 days: current min max
0 0 1
Current as of November 14, 2011 [Learn more](#)

Service settings [Add more services](#)

Google Apps Marketplace *New*
Get more apps including accounting, CRM, marketing, project management and admin tools. [Shop the marketplace »](#)

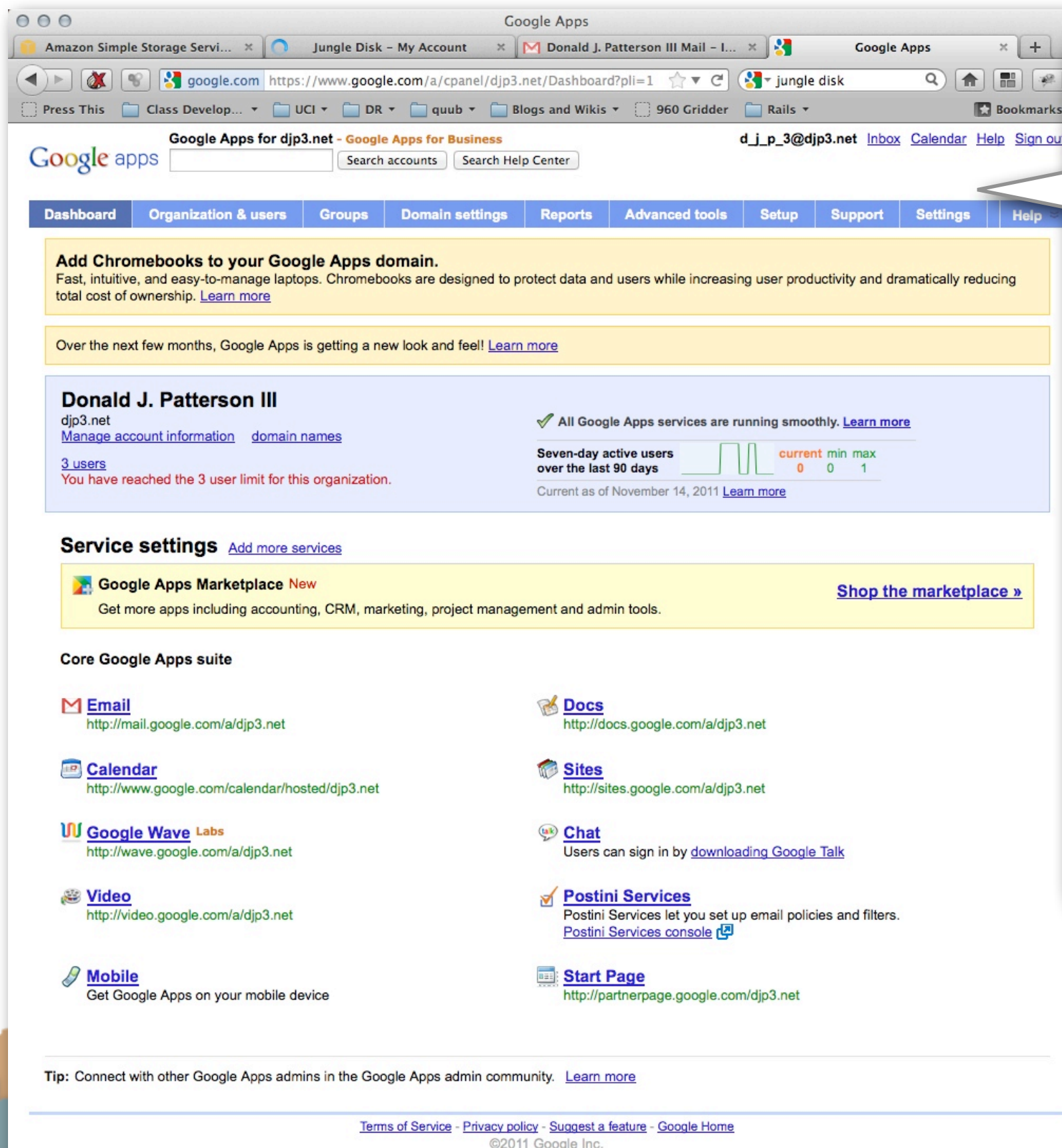
Core Google Apps suite

Email http://mail.google.com/a/djp3.net	Docs http://docs.google.com/a/djp3.net
Calendar http://www.google.com/calendar/hosted/djp3.net	Sites http://sites.google.com/a/djp3.net
Google Wave <i>Labs</i> http://wave.google.com/a/djp3.net	Chat Users can sign in by downloading Google Talk
Video http://video.google.com/a/djp3.net	Postini Services Postini Services let you set up email policies and filters. Postini Services console
Mobile Get Google Apps on your mobile device	Start Page http://partnerpage.google.com/djp3.net

Tip: Connect with other Google Apps admins in the Google Apps admin community. [Learn more](#)

[Terms of Service](#) - [Privacy policy](#) - [Suggest a feature](#) - [Google Home](#)
©2011 Google Inc.

Services vision : Google Apps



The screenshot shows the Google Apps dashboard for the domain djp3.net. The browser tabs include Amazon Simple Storage Service, Jungle Disk - My Account, Donald J. Patterson III Mail - I..., and Google Apps. The dashboard header shows the Google Apps logo, a search bar, and the user's email address d_j_p_3@djp3.net with links to Inbox, Calendar, Help, and Sign out. The main navigation bar includes Dashboard, Organization & users, Groups, Domain settings, Reports, Advanced tools, Setup, Support, Settings, and Help. The dashboard content includes a yellow banner about adding Chromebooks, a blue box for the user Donald J. Patterson III showing account information and a graph of seven-day active users, a yellow box for Google Apps Marketplace, and a section for the Core Google Apps suite with links to Email, Calendar, Google Wave Labs, Video, Mobile, Docs, Sites, Chat, Postini Services, and Start Page. A tip at the bottom suggests connecting with other Google Apps admins in the community.

Google Apps for djp3.net - Google Apps for Business

d_j_p_3@djp3.net [Inbox](#) [Calendar](#) [Help](#) [Sign out](#)

[Search accounts](#) [Search Help Center](#)


Dashboard Organization & users Groups Domain settings Reports Advanced tools Setup Support Settings Help

Add Chromebooks to your Google Apps domain.
Fast, intuitive, and easy-to-manage laptops. Chromebooks are designed to protect data and users while increasing user productivity and dramatically reducing total cost of ownership. [Learn more](#)


Over the next few months, Google Apps is getting a new look and feel! [Learn more](#)

Donald J. Patterson III
djp3.net
[Manage account information](#) [domain names](#)
[3 users](#)
You have reached the 3 user limit for this organization.


✓ All Google Apps services are running smoothly. [Learn more](#)


Seven-day active users over the last 90 days  current min max
0 0 1
Current as of November 14, 2011 [Learn more](#)


Service settings [Add more services](#)


 **Google Apps Marketplace** [New](#)
Get more apps including accounting, CRM, marketing, project management and admin tools. [Shop the marketplace »](#)


Core Google Apps suite


 **Email**
<http://mail.google.com/a/djp3.net>


 **Calendar**
<http://www.google.com/calendar/hosted/djp3.net>


 **Google Wave** [Labs](#)
<http://wave.google.com/a/djp3.net>



 **Video**
<http://video.google.com/a/djp3.net>


 **Mobile**
Get Google Apps on your mobile device

 **Docs**
<http://docs.google.com/a/djp3.net>

 **Sites**
<http://sites.google.com/a/djp3.net>

 **Chat**
Users can sign in by [downloading Google Talk](#)

 **Postini Services**
Postini Services let you set up email policies and filters.
[Postini Services console](#) 

 **Start Page**
<http://partnerpage.google.com/djp3.net>

Tip: Connect with other Google Apps admins in the Google Apps admin community. [Learn more](#)

[Terms of Service](#) - [Privacy policy](#) - [Suggest a feature](#) - [Google Home](#)
©2011 Google Inc.

A suite of collaborative business apps including email, calendar, word processing, spreadsheet, "powerpoint", chat

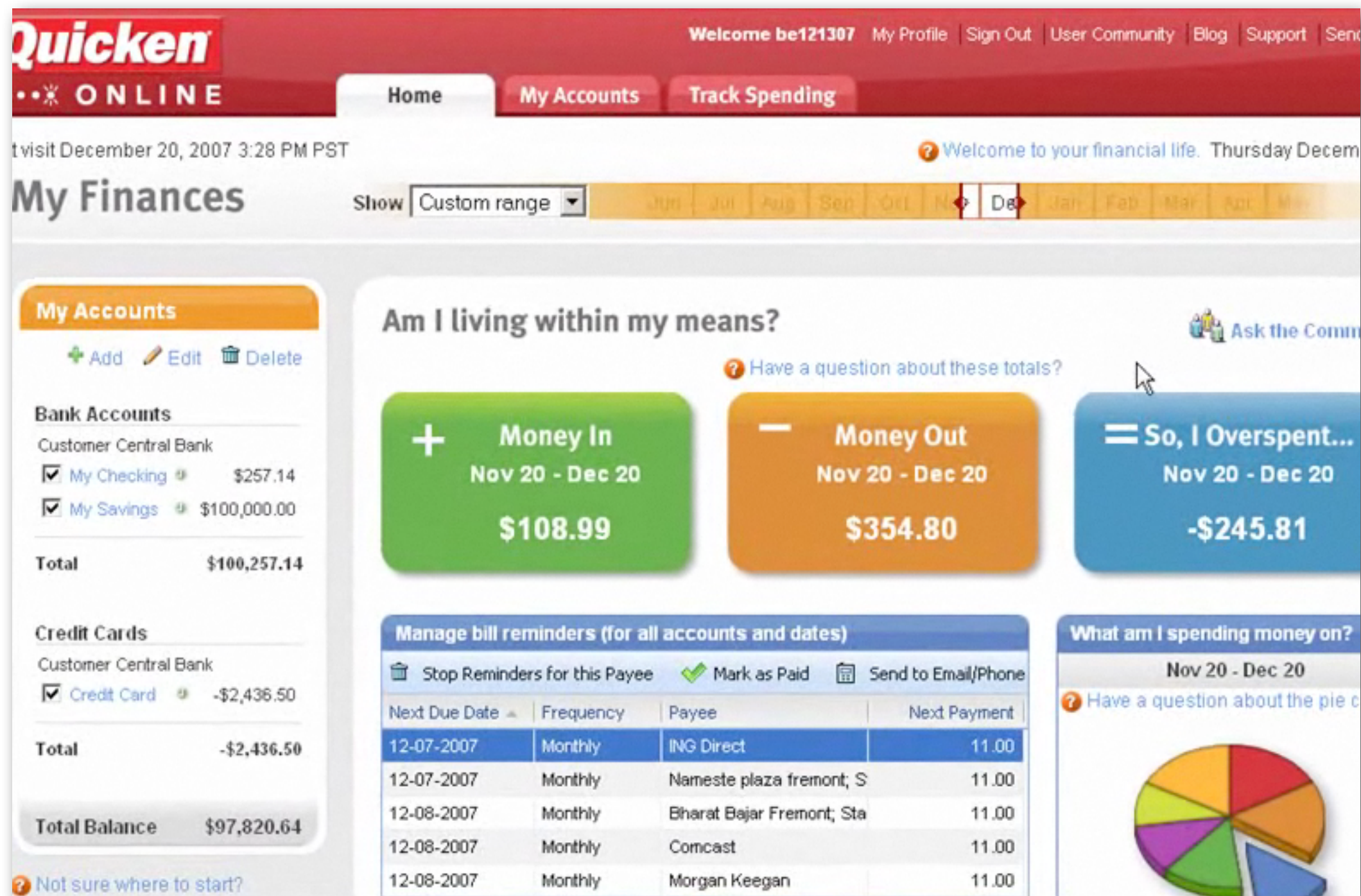
No limit on storage, no ads, no software updating, no security management, no downtime

(It is all backed by Google's data center)

Always on, available from any browser

\$50.00 per user/per year

Services vision : Quicken Online



Services vision : Quicken Online

The screenshot displays the Quicken Online web interface. At the top, the Quicken logo is on the left, and a welcome message 'Welcome be121307' with links for 'My Profile' and 'Sign Out' is on the right. Below the logo, the word 'ONLINE' is prominently displayed. A navigation bar includes 'Home', 'My Accounts', and 'Track Spending'. The main content area is titled 'My Finances' and includes a date range selector set to 'Custom range' for the month of December. On the left, a sidebar titled 'My Accounts' lists 'Bank Accounts' (Customer Central Bank) with 'My Checking' at \$257.14 and 'My Savings' at \$100,000.00, totaling \$100,257.14. It also lists 'Credit Cards' (Customer Central Bank) with a 'Credit Card' balance of -\$2,436.50, totaling -\$2,436.50. The 'Total Balance' is shown as \$97,820.64. The main area features a section titled 'Am I living within my means?' with two large boxes: a green box for 'Money In' (Nov 20 - Dec 20) at \$108.99, and an orange box for 'Money Out' (Nov 20 - Dec 20) at \$354.80. Below this is a 'Manage bill reminders' table with columns for 'Next Due Date', 'Frequency', 'Payee', and 'Next Payment'. The table lists several bills, including ING Direct, Nameste plaza fremont, S, Bharat Bajar Fremont, Sta, Comcast, and Morgan Keegan, all with monthly frequencies and due dates in December 2007.

Quicken
ONLINE

Welcome be121307 My Profile Sign Out

Home My Accounts Track Spending

Visit December 20, 2007 3:28 PM PST

My Finances

Show Custom range

My Accounts

+ Add Edit Delete

Bank Accounts

Customer Central Bank

☒ My Checking \$257.14

☒ My Savings \$100,000.00

Total \$100,257.14

Credit Cards

Customer Central Bank

☒ Credit Card -\$2,436.50

Total -\$2,436.50

Total Balance \$97,820.64

Am I living within my means?

+ Money In Nov 20 - Dec 20 \$108.99

- Money Out Nov 20 - Dec 20 \$354.80

Manage bill reminders (for all accounts and dates)

Stop Reminders for this Payee Mark as Paid Send to Email/Phone

Next Due Date	Frequency	Payee	Next Payment
12-07-2007	Monthly	ING Direct	11.00
12-07-2007	Monthly	Nameste plaza fremont, S	11.00
12-08-2007	Monthly	Bharat Bajar Fremont, Sta	11.00
12-08-2007	Monthly	Comcast	11.00
12-08-2007	Monthly	Morgan Keegan	11.00

Not sure where to start?

Manage your money and finances online. Quicken connects to banks for you.

No backups, no hacker break-ins.

(It is all backed by ?'s data center)

Always on, available from any browser

\$2.99/per year



What are the visions?

- **Consumer**
 - Don't think about the cloud
- **Services**
 - Always available apps
- **Infrastructure**
 - Build with our tech services
 - Virtual Machines
 - Rent a cloud computer



What are the visions?

- Consumer
 - Don't think about the cloud
- Services
 - Always available apps
- Infrastructure
 - Build with our tech services
 - Virtual Machines
 - Rent a cloud computer



Infrastructure: Amazon web services

The screenshot displays the AWS Management Console interface for the Amazon EC2 service. The browser address bar shows the URL `https://console.aws.amazon.com/ec2/home?region=us-east-1`. The console header includes the AWS logo, the text "AWS Management Console", and a navigation bar with links to various services like Elastic Beanstalk, S3, EC2, VPC, CloudWatch, Elastic MapReduce, CloudFront, CloudFormation, RDS, ElastiCache, SQS, IAM, SNS, and SES. The user's name, Donald J. Patterson, and a Help link are visible in the top right corner.

The main content area is titled "Amazon EC2 Console Dashboard" and is divided into three main sections:

- Navigation:** A sidebar on the left with a "Region:" dropdown set to "US East (Virginia)". It lists categories like EC2 Dashboard, INSTANCES, IMAGES, ELASTIC BLOCK STORE, and NETWORK & SECURITY, each with sub-links.
- Getting Started:** A central panel with a yellow background. It contains the text: "To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance." Below this is a "Launch Instance" button. A note states: "Note: Your instances will launch in the US East (Virginia) region."
- My Resources:** A panel on the right showing a summary of resources in the US East (Virginia) region. It includes a "Refresh" button and counts for: 0 Running Instances, 0 Elastic IPs, 0 EBS Volumes, 0 EBS Snapshots, 1 Key Pair, 2 Security Groups, 0 Load Balancers, and 0 Placement Groups.

Below the "Getting Started" section is a "Service Health" section. It contains two tables:

Service Status	
Current Status	Details
✓ Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

Availability Zone Status	
Current Status	Details
✓ us-east-1a	Availability zone is operating normally
✓ us-east-1b	Availability zone is operating normally
✓ us-east-1c	Availability zone is operating normally
✓ us-east-1d	Availability zone is operating normally

At the bottom of the console, there is a footer with copyright information: "© 2008 - 2011, Amazon Web Services LLC or its affiliates. All rights reserved." and links for Feedback, Support, Privacy Policy, Terms of Use, and a statement "An amazon.com company".

Infrastructure: Amazon web services

AWS Management Console

Region: US East (Virginia)

Amazon EC2 Console Dashboard

Getting Started

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

[Launch Instance](#)

Note: Your instances will launch in the US East (Virginia) region.

Service Health

Service Status

Current Status	Details
✓ Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

Availability Zone Status

Current Status	Details
✓ us-east-1a	Availability zone is operating normally
✓ us-east-1b	Availability zone is operating normally
✓ us-east-1c	Availability zone is operating normally
✓ us-east-1d	Availability zone is operating normally

My Resources

You are using the following Amazon EC2 resources in the US East (Virginia) region:

- 0 Running Instances
- 0 Elastic IPs
- 0 EBS Volumes
- 0 EBS Snapshots
- 1 Key Pair
- 2 Security Groups
- 0 Load Balancers
- 0 Placement Groups

Related Links

- Documentation
- All EC2 Resources
- Forums
- Feedback
- Report an Issue

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Create a computer in 2 minutes

Use it for as long as you want,
then shut it down.

\$0.085 per hour
(\$744 per year)

Infrastructure: Amazon web services

The screenshot displays the AWS Management Console interface for the Amazon EC2 service. The browser address bar shows the URL `https://console.aws.amazon.com/ec2/home?region=us-east-1`. The console header includes the AWS logo, the text "AWS Management Console", and a navigation bar with various AWS services like Elastic Beanstalk, S3, EC2, VPC, CloudWatch, Elastic MapReduce, CloudFront, CloudFormation, RDS, ElastiCache, SQS, IAM, SNS, and SES. The user's name, Donald J. Patterson, and a "Help" link are visible in the top right corner.

The main content area is titled "Amazon EC2 Console Dashboard" and is divided into several sections:

- Navigation:** A sidebar on the left lists various EC2 resources under categories like INSTANCES, IMAGES, ELASTIC BLOCK STORE, and NETWORK & SECURITY. The "Region" is set to "US East (Virginia)".
- Getting Started:** A yellow box with the text "To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance." and a prominent "Launch Instance" button. A note below states: "Note: Your instances will launch in the US East (Virginia) region."
- Service Health:** A section showing the status of the Amazon EC2 service. It includes a "Service Status" table and an "Availability Zone Status" table.
- My Resources:** A section displaying the number of resources currently in use in the selected region. It includes a "Refresh" button.
- Related Links:** A section with links to documentation, all EC2 resources, forums, feedback, and reporting an issue.

Service Status Table:

Current Status	Details
✓ Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

Availability Zone Status Table:

Current Status	Details
✓ us-east-1a	Availability zone is operating normally
✓ us-east-1b	Availability zone is operating normally
✓ us-east-1c	Availability zone is operating normally
✓ us-east-1d	Availability zone is operating normally

My Resources Summary:

- 0 Running Instances
- 0 Elastic IPs
- 0 EBS Volumes
- 0 EBS Snapshots
- 1 Key Pair
- 2 Security Groups
- 0 Load Balancers
- 0 Placement Groups

At the bottom of the console, there is a footer with copyright information: "© 2008 - 2011, Amazon Web Services LLC or its affiliates. All rights reserved." and links for Feedback, Support, Privacy Policy, Terms of Use, and a statement "An amazon.com company".

Infrastructure: Amazon web services

AWS Management Console

Region: US East (Virginia)

EC2 Dashboard

- INSTANCES
 - Instances
 - Spot Requests
 - Reserved Instances
- IMAGES
 - AMIs
 - Bundle Tasks
- ELASTIC BLOCK STORAGE
 - Volumes
 - Snapshots
- NETWORK & SECURITY
 - Security Groups
 - Elastic IPs
 - Placement Groups
 - Load Balancers
 - Key Pairs

My Resources

You are using the following Amazon EC2 resources in the US East (Virginia) region:

- 0 Running Instances
- 0 Elastic IPs
- 0 EBS Volumes
- 0 EBS Snapshots
- 1 Key Pair
- 2 Security Groups
- 0 Load Balancers
- 0 Placement Groups

Related Links

- Documentation
- All EC2 Resources
- Forums
- Feedback
- Report an Issue

Availability Zone Status

Current Status	Details
✓ us-east-1a	Availability zone is operating normally
✓ us-east-1b	Availability zone is operating normally
✓ us-east-1c	Availability zone is operating normally
✓ us-east-1d	Availability zone is operating normally

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Create an auto-scaling Tomcat environment in 2 minutes

“easy to begin, impossible to outgrow”

\$35.27/month for basic usage

Infrastructure: Amazon web services

The screenshot displays the AWS Management Console interface for the Amazon EC2 service. The browser window shows the URL `https://console.aws.amazon.com/ec2/home?region=us-east-1`. The console header includes the AWS logo, the text "AWS Management Console", and a navigation bar with various services like Elastic Beanstalk, S3, EC2, VPC, CloudWatch, Elastic MapReduce, CloudFront, CloudFormation, RDS, ElastiCache, SQS, IAM, SNS, and SES. The user's name "Donald J. Patterson" and a "Help" link are visible in the top right.

The main content area is titled "Amazon EC2 Console Dashboard". It features a "Getting Started" section with a yellow background, instructing users to launch a virtual server (Amazon EC2 instance) and providing a "Launch Instance" button. A note specifies that instances will launch in the US East (Virginia) region.

The "Service Health" section contains two tables:

Service Status	
Current Status	Details
✓ Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

Availability Zone Status	
Current Status	Details
✓ us-east-1a	Availability zone is operating normally
✓ us-east-1b	Availability zone is operating normally
✓ us-east-1c	Availability zone is operating normally
✓ us-east-1d	Availability zone is operating normally

The "My Resources" section on the right lists the following resources in the US East (Virginia) region:

- 0 Running Instances
- 0 Elastic IPs
- 0 EBS Volumes
- 0 EBS Snapshots
- 1 Key Pair
- 2 Security Groups
- 0 Load Balancers
- 0 Placement Groups

The "Related Links" section provides links to Documentation, All EC2 Resources, Forums, Feedback, and Report an Issue.

At the bottom, the footer states: "© 2008 - 2011, Amazon Web Services LLC or its affiliates. All rights reserved. | Feedback | Support | Privacy Policy | Terms of Use | An amazon.com company".

Infrastructure: Amazon web services

The screenshot shows the AWS Management Console interface for the Amazon EC2 service. The main heading is 'Amazon EC2 Console Dashboard'. A callout box points to the 'Launch Instance' button and displays the price '\$0.11/hour'. The dashboard includes a 'Getting Started' section with instructions on launching a virtual server, a 'Service Health' section showing the current status of Amazon EC2 (US East - N. Virginia) as 'operating normally', and an 'Availability Zone Status' section showing four zones (us-east-1a, us-east-1b, us-east-1c, us-east-1d) all operating normally. The left sidebar contains a navigation menu with categories like INSTANCES, IMAGES, ELASTIC BLOCK STORE, and NETWORK & SECURITY. The top navigation bar lists various AWS services like Elastic Beanstalk, S3, VPC, CloudWatch, etc. The bottom of the page features a copyright notice and links for Feedback, Support, Privacy Policy, and Terms of Use.

Navigation

Region: US East (Virginia)

EC2 Dashboard

- INSTANCES
 - Instances
 - Spot Requests
 - Reserved Instances
- IMAGES
 - AMIs
 - Bundle Tasks
- ELASTIC BLOCK STORE
 - Volumes
 - Snapshots
- NETWORK & SECURITY
 - Security Groups
 - Elastic IPs
 - Placement Groups
 - Load Balancers
 - Key Pairs

Amazon EC2 Console Dashboard

Getting Started

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

[Launch Instance](#)

Note: Your instances will launch in the US East (Virginia) region.

Service Health

Service Status

Current Status	Details
Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

Availability Zone Status

Current Status	Details
us-east-1a	Availability zone is operating normally
us-east-1b	Availability zone is operating normally
us-east-1c	Availability zone is operating normally
us-east-1d	Availability zone is operating normally

Related Links

- Documentation
- All EC2 Resources
- Forums
- Feedback
- Report an Issue

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Infrastructure: Amazon web services

The screenshot displays the AWS Management Console interface for the Amazon EC2 service. The browser address bar shows the URL `https://console.aws.amazon.com/ec2/home?region=us-east-1`. The console header includes the AWS logo, the text "AWS Management Console", and a user profile for "Donald J. Patterson". A navigation pane on the left lists various AWS services, with "Amazon EC2" selected. The main content area is titled "Amazon EC2 Console Dashboard" and is divided into three sections: "Getting Started", "Service Health", and "My Resources".

Getting Started

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

[Launch Instance](#)

Note: Your instances will launch in the US East (Virginia) region.

Service Health

Service Status

Current Status	Details
✓ Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

Availability Zone Status

Current Status	Details
✓ us-east-1a	Availability zone is operating normally
✓ us-east-1b	Availability zone is operating normally
✓ us-east-1c	Availability zone is operating normally
✓ us-east-1d	Availability zone is operating normally

My Resources

You are using the following Amazon EC2 resources in the US East (Virginia) region:

0 Running Instances	0 Elastic IPs
0 EBS Volumes	0 EBS Snapshots
1 Key Pair	2 Security Groups
0 Load Balancers	0 Placement Groups

Related Links

- Documentation
- All EC2 Resources
- Forums
- Feedback
- Report an Issue

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Infrastructure: Amazon web services

The screenshot shows the AWS Management Console for the Amazon EC2 service in the US East (Virginia) region. The console displays the 'Getting Started' section with a 'Launch' button and a note about instance launch. It also shows the 'Service Health' section with a table of service status and availability zone status.

Navigation

- Region: US East (Virginia)
- EC2 Dashboard
 - INSTANCES
 - Instances
 - Spot Requests
 - Reserved Instances
 - IMAGES
 - AMIs
 - Bundle Tasks
 - ELASTIC BLOCK STORE
 - Volumes
 - Snapshots
 - NETWORK & SECURITY
 - Security Groups
 - Elastic IPs
 - Placement Groups
 - Load Balancers
 - Key Pairs

Amazon EC2 Console Dashboard

Getting Started

To start using Amazon EC2 you will need to launch an Amazon EC2 instance.

[Launch](#)

Note: Your instances will launch in the US East (Virginia) region.

Service Health

Service Status

Current Status	Details
✓ Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

Availability Zone Status

Current Status	Details
✓ us-east-1a	Availability zone is operating normally
✓ us-east-1b	Availability zone is operating normally
✓ us-east-1c	Availability zone is operating normally
✓ us-east-1d	Availability zone is operating normally

EC2 resources in the US East [Refresh](#)

- 0 Elastic IPs
- 0 EBS Snapshots
- 2 Security Groups
- 0 Load Balancers
- 0 Placement Groups

Related Links

- Documentation
- All EC2 Resources
- Forums
- Feedback
- Report an Issue

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Infrastructure: Heroku platform services

The screenshot displays the Heroku 'How it Works' page in a web browser. The page features a dark blue header with the Heroku logo and navigation links: 'How it Works', 'Pricing', 'Add-ons', 'Dev Center', 'Support', 'Contact', and a 'Login' button. Below the header, a process flow diagram shows the sequence: Build (Deploy, Connect, Command) and Operate (Observe, Scale, Relax). The main content area includes a 'How it Works' section with a descriptive paragraph and a call to action to explore the diagram. The diagram itself illustrates the Heroku architecture, showing a 'Control Surface APIs' layer on top of a 'Dyno Manifold' layer, which sits on 'Logplex'. Above the manifold, 'Routing Dynos' and 'Process Types' are shown. At the bottom of the diagram are icons for a database, a bar chart, a funnel, and a menu. The footer contains four columns of links: Heroku (About, Contact, Jobs, Legal, Privacy Policy), Business (Why Heroku, Success Stories, Partner Program, News & Events, Blog), Platform (How it Works, Pricing, Add-ons), and Resources (Documentation, Support, Status).

Heroku | How it Works

Heroku | How it Works

How it Works | Pricing | Add-ons | Dev Center | Support | Contact | Login

Build: Deploy, Connect, Command

Operate: Observe, Scale, Relax

How it Works

Take a tour of the most productive, powerful, and scalable cloud application platform, and learn how Heroku structures and handles your app, deploys, scaling, and traffic.

Click around the diagram or the tabs above to explore.

Control Surface APIs

Dyno Manifold

Logplex

Routing Dynos

Process Types

Heroku

- About
- Contact
- Jobs
- Legal
- Privacy Policy

Business

- Why Heroku
- Success Stories
- Partner Program
- News & Events
- Blog

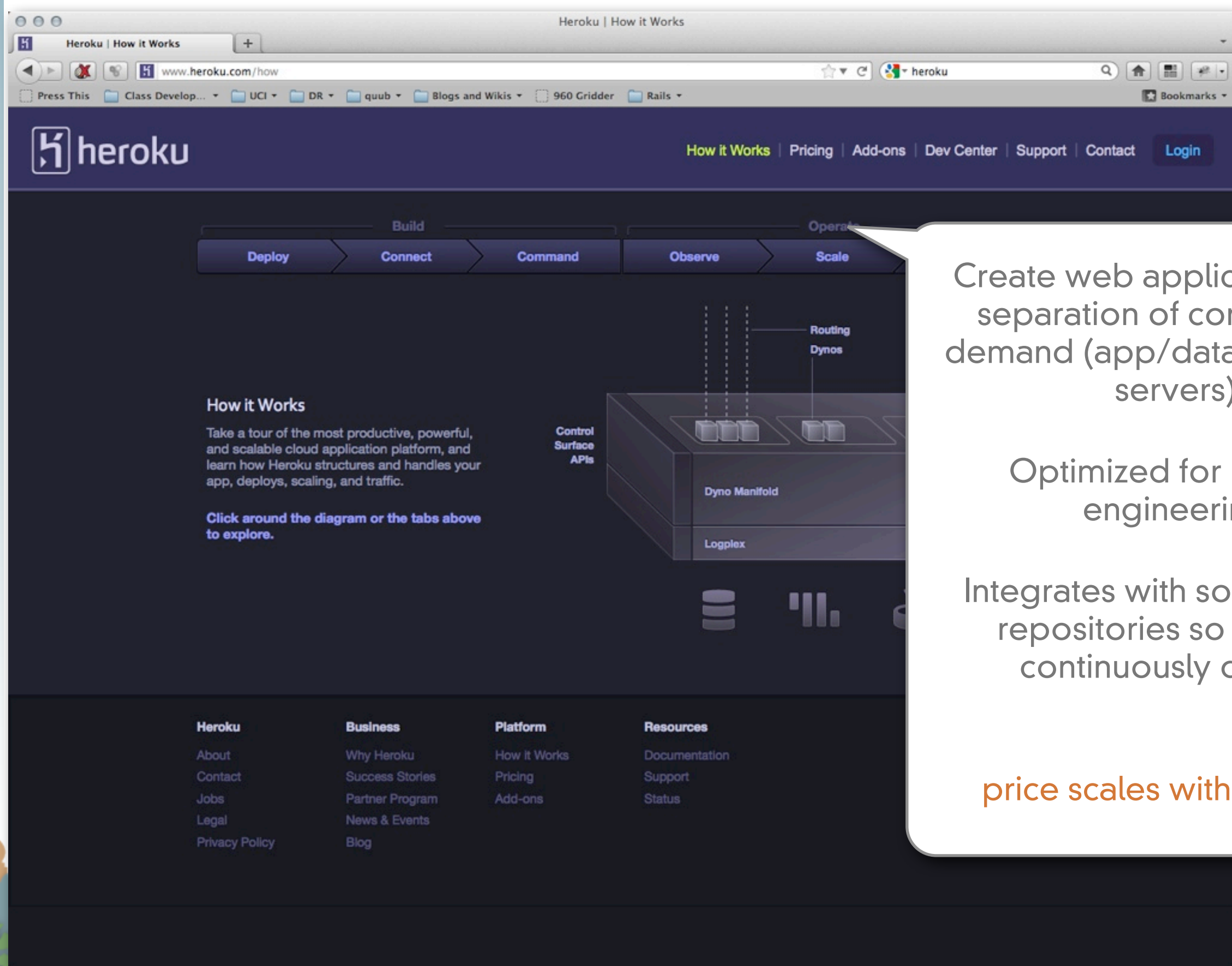
Platform

- How it Works
- Pricing
- Add-ons

Resources

- Documentation
- Support
- Status

Infrastructure: Heroku platform services



Create web applications with separation of concerns on demand (app/database/asset servers)

Optimized for release engineering

Integrates with source code repositories so you can continuously deploy

price scales with demand

What are the visions?

- **Consumer**
 - Don't think about the cloud
- **Services**
 - Always available apps
- **Infrastructure**
 - Build with our tech services
 - Virtual Machines
 - Rent a cloud computer



What are the visions?

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 - Virtual Machines
 - Rent a cloud computer



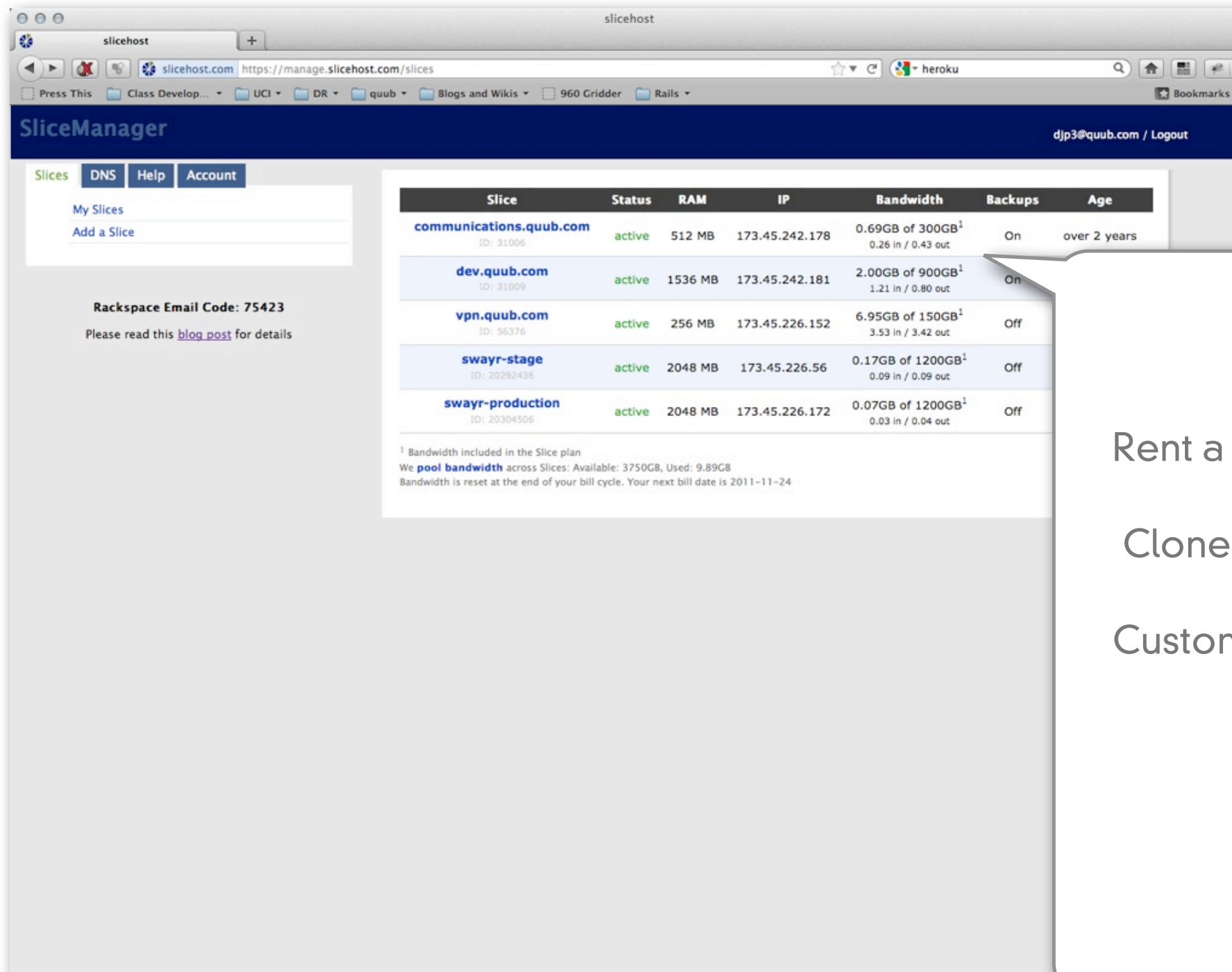
Virtual Machines: Slicehost

The screenshot shows the SliceManager web interface in a browser window. The browser's address bar displays 'https://manage.slicehost.com/slices'. The interface has a dark blue header with the 'SliceManager' logo and a user login 'djp3@quub.com / Logout'. Below the header is a navigation bar with tabs for 'Slices', 'DNS', 'Help', and 'Account'. The 'Slices' tab is active, showing a list of virtual slices. On the left side, there are links for 'My Slices' and 'Add a Slice', and a section for 'Rackspace Email Code: 75423' with a link to a 'blog post'. The main content area contains a table with the following data:

Slice	Status	RAM	IP	Bandwidth	Backups	Age
communications.quub.com ID: 31006	active	512 MB	173.45.242.178	0.69GB of 300GB ¹ 0.26 in / 0.43 out	On	over 2 years
dev.quub.com ID: 31009	active	1536 MB	173.45.242.181	2.00GB of 900GB ¹ 1.21 in / 0.80 out	On	over 2 years
vpn.quub.com ID: 56376	active	256 MB	173.45.226.152	6.95GB of 150GB ¹ 3.53 in / 3.42 out	Off	over 2 years
swayr-stage ID: 20292436	active	2048 MB	173.45.226.56	0.17GB of 1200GB ¹ 0.09 in / 0.09 out	Off	about 1 month
swayr-production ID: 20304506	active	2048 MB	173.45.226.172	0.07GB of 1200GB ¹ 0.03 in / 0.04 out	Off	25 days

¹ Bandwidth included in the Slice plan
We **pool bandwidth** across Slices: Available: 3750GB, Used: 9.89GB
Bandwidth is reset at the end of your bill cycle. Your next bill date is 2011-11-24

Virtual Machines: Slicehost



The screenshot shows the SliceManager web interface. The browser address bar displays 'https://manage.slicehost.com/slices'. The page has a dark blue header with 'SliceManager' and a user login 'djp3@quub.com / Logout'. Below the header is a navigation bar with 'Slices', 'DNS', 'Help', and 'Account'. The main content area features a table of virtual machines (slices) and a sidebar on the left with 'My Slices' and 'Add a Slice' links. The table lists five slices: 'communications.quub.com', 'dev.quub.com', 'vpn.quub.com', 'swayr-stage', and 'swayr-production'. Each row shows the slice name, ID, status (all 'active'), RAM, IP, bandwidth usage, backup status, and age. A sidebar on the left contains 'My Slices' and 'Add a Slice' links. Below the table, there is a note about bandwidth: 'Bandwidth included in the Slice plan. We pool bandwidth across Slices: Available: 3750GB, Used: 9.89GB. Bandwidth is reset at the end of your bill cycle. Your next bill date is 2011-11-24.'

Slice	Status	RAM	IP	Bandwidth	Backups	Age
communications.quub.com ID: 31006	active	512 MB	173.45.242.178	0.69GB of 300GB ¹ 0.26 in / 0.43 out	On	over 2 years
dev.quub.com ID: 31009	active	1536 MB	173.45.242.181	2.00GB of 900GB ¹ 1.21 in / 0.80 out	On	
vpn.quub.com ID: 56376	active	256 MB	173.45.226.152	6.95GB of 150GB ¹ 3.53 in / 3.42 out	Off	
swayr-stage ID: 20292436	active	2048 MB	173.45.226.56	0.17GB of 1200GB ¹ 0.09 in / 0.09 out	Off	
swayr-production ID: 20304506	active	2048 MB	173.45.226.172	0.07GB of 1200GB ¹ 0.03 in / 0.04 out	Off	

¹ Bandwidth included in the Slice plan
We pool bandwidth across Slices: Available: 3750GB, Used: 9.89GB
Bandwidth is reset at the end of your bill cycle. Your next bill date is 2011-11-24

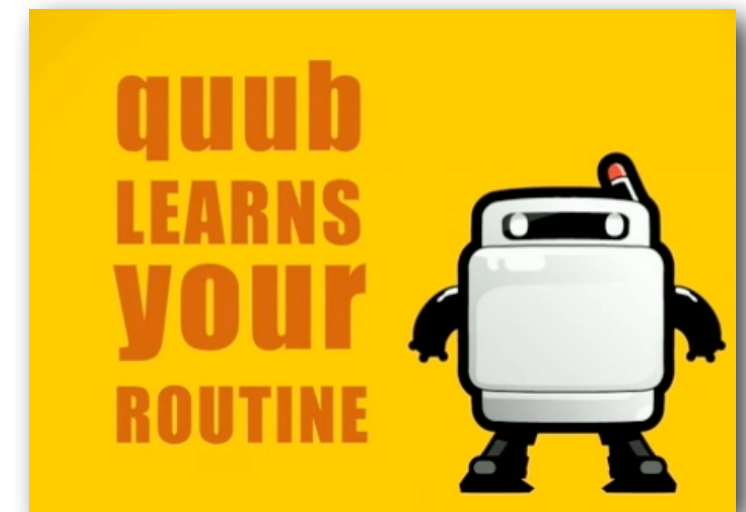
Rent a computer on demand

Clone an existing computer

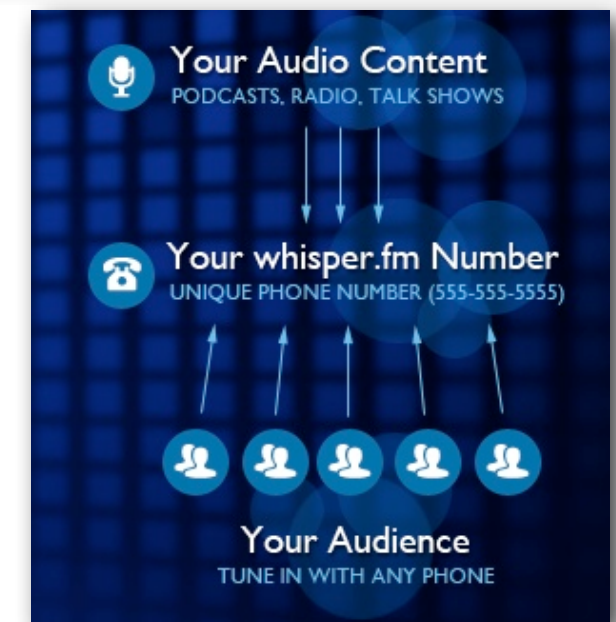
Customer does all the admin

\$40.00 / month

What is my experience?



- <http://www.quub.com>
- <http://whisper.fm>
- <http://swayr.com>



What is my experience?

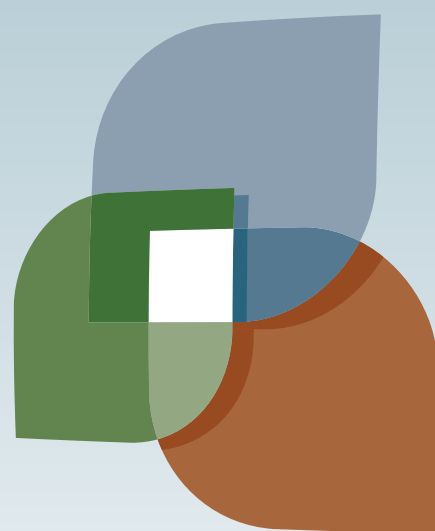
- Robustness is hard
 - Ambulance
 - Latency works against you
- Dealing with venture capitalists is rough
 - selling the future (bump)
 - “build a great company”
- Tried to go into China
 - microblog monitoring
 - copied the product
 - car logger



What is my experience?

- “this is too futuristic for us”
- Other thoughts
 - geographical domain and legislation hasn’t caught up yet with cloud abstractions
 - It’s not actually a cloud - it consumes resources
 - The movie Avatar create 1 petabyte of data





L U C I

