

OpenCloud: A Unified Service Framework

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The Cloud is about services

The screenshot displays the AWS Management Console interface. The browser address bar shows <https://console.aws.amazon.com/console/home?#>. The top navigation bar includes the 'Services' dropdown menu, the user name 'Larry Peterson', and the region 'Global'. The main content area is titled 'Amazon Web Services' and is organized into several columns of service cards, each with an icon and a brief description:

- Compute & Networking:** Direct Connect (Dedicated Network Connection to AWS), **EC2** (Virtual Servers in the Cloud), Route 53 (Scalable Domain Name System), VPC (Isolated Cloud Resources), WorkSpaces (Desktops in the Cloud).
- Storage & Content Delivery:** CloudFront (Global Content Delivery Network), Glacier (Archive Storage in the Cloud), S3 (Scalable Storage in the Cloud), Storage Gateway (Integrates On-Premises IT Environments with Cloud Storage).
- Database:** DynamoDB (Predictable and Scalable NoSQL Data Store), ElastiCache (In-Memory Cache), RDS (Managed Relational Database Service), Redshift (Managed Petabyte-Scale Data Warehouse Service).
- Analytics:** Data Pipeline (Orchestration for Data-Driven Workflows), Elastic MapReduce (Managed Hadoop Framework), Kinesis (Real-time Processing of Streaming Big Data).
- Deployment & Management:** CloudFormation (Templated AWS Resource Creation), CloudTrail (User Activity and Change Tracking), CloudWatch (Resource and Application Monitoring), Elastic Beanstalk (AWS Application Container), IAM (Secure AWS Access Control), OpsWorks (DevOps Application Management Service).
- App Services:** AppStream (Low Latency Application Streaming), CloudSearch (Managed Search Service), Elastic Transcoder (Easy-to-use Scalable Media Transcoding), SES (Email Sending Service), SNS (Push Notification Service), SQS (Message Queue Service), SWF (Workflow Service for Coordinating Application Components).

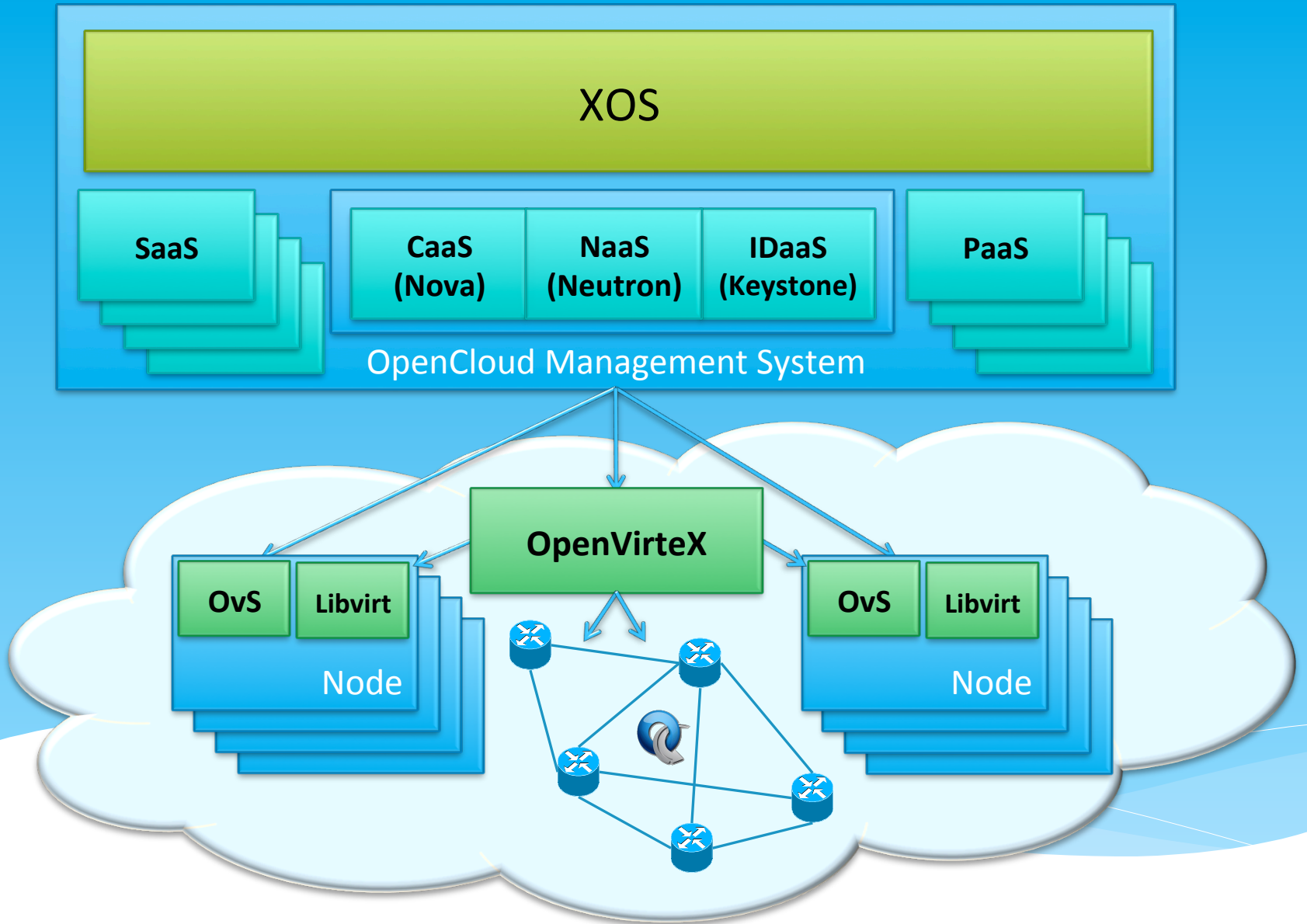
On the right side, the 'Additional Resources' section includes links for 'Getting Started', 'Trusted Advisor', 'Service Health' (with a green checkmark indicating 'All services operating normally'), and 'Set Start Page' (with a 'Console Home' button).

Can we create a similar ecosystem of research services?

OpenCloud's goals

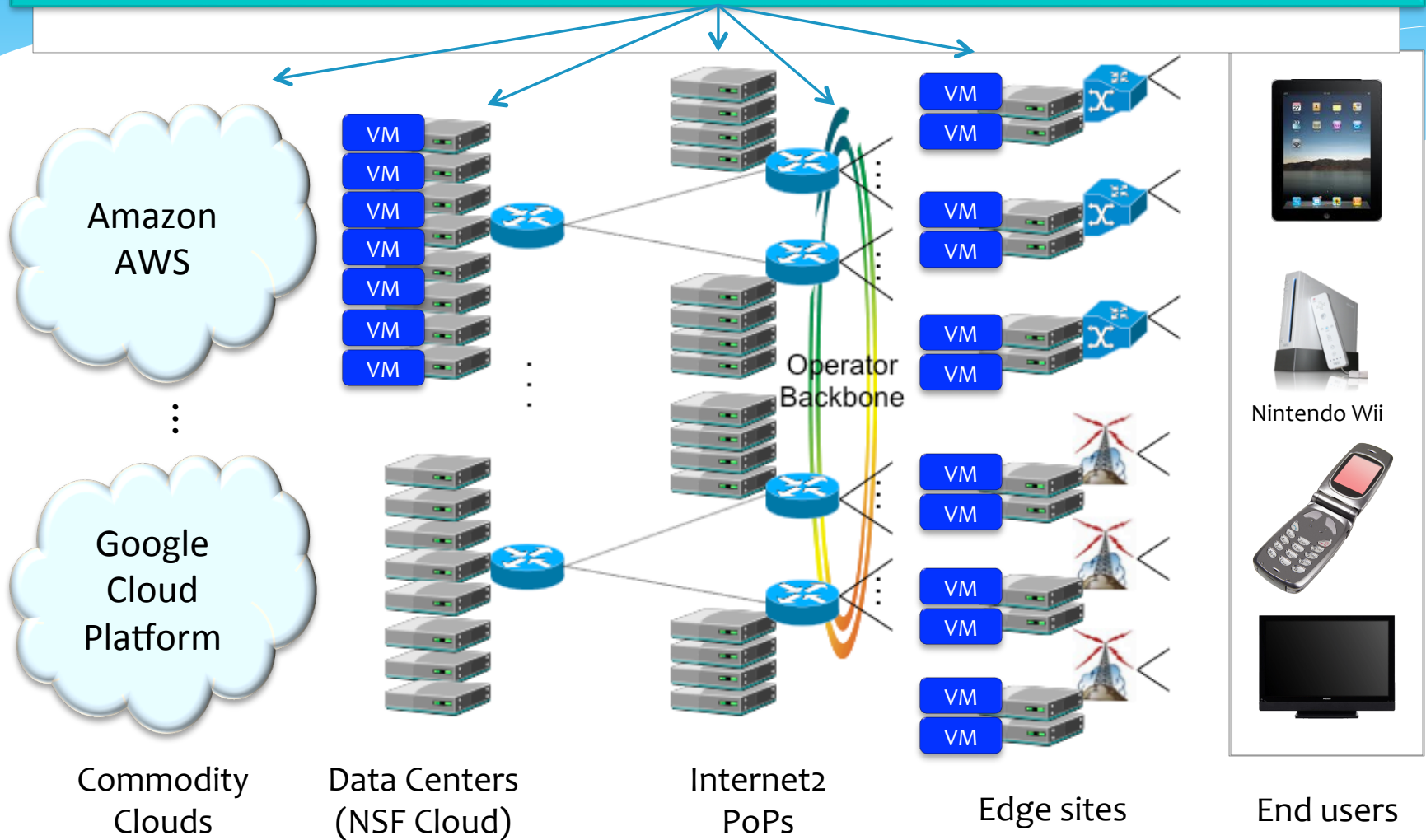
- * Build and operate a “meta-Cloud”
 - * Support *long-running services*
 - * Integrate with commodity clouds (e.g., EC2), research clouds (NSF Cloud), testbeds (GENI, PlanetLab)
 - * Spans data centers, network PoPs, edge sites
- * With a unifying architecture
 - * Designed around *composable services*
 - * Key principle: XaaS - Everything as a Service
- * Leveraging open-source software
 - * XOS, OpenStack, OpenVirteX

Software architecture



The meta-cloud

OpenCloud XOS



Desired NSFCloud capabilities

- * We want *long-term resources*
 - * Clusters of bare metal servers at multiple sites
 - * Programmable OF inter-cluster networks
 - * Dependable BW between clusters
- * We hope to *grow the clusters and BW* over time
 - * Can start small (~10 servers per site)
 - * Expand when we see growth in our user base, services

<http://www.opencloud.us>