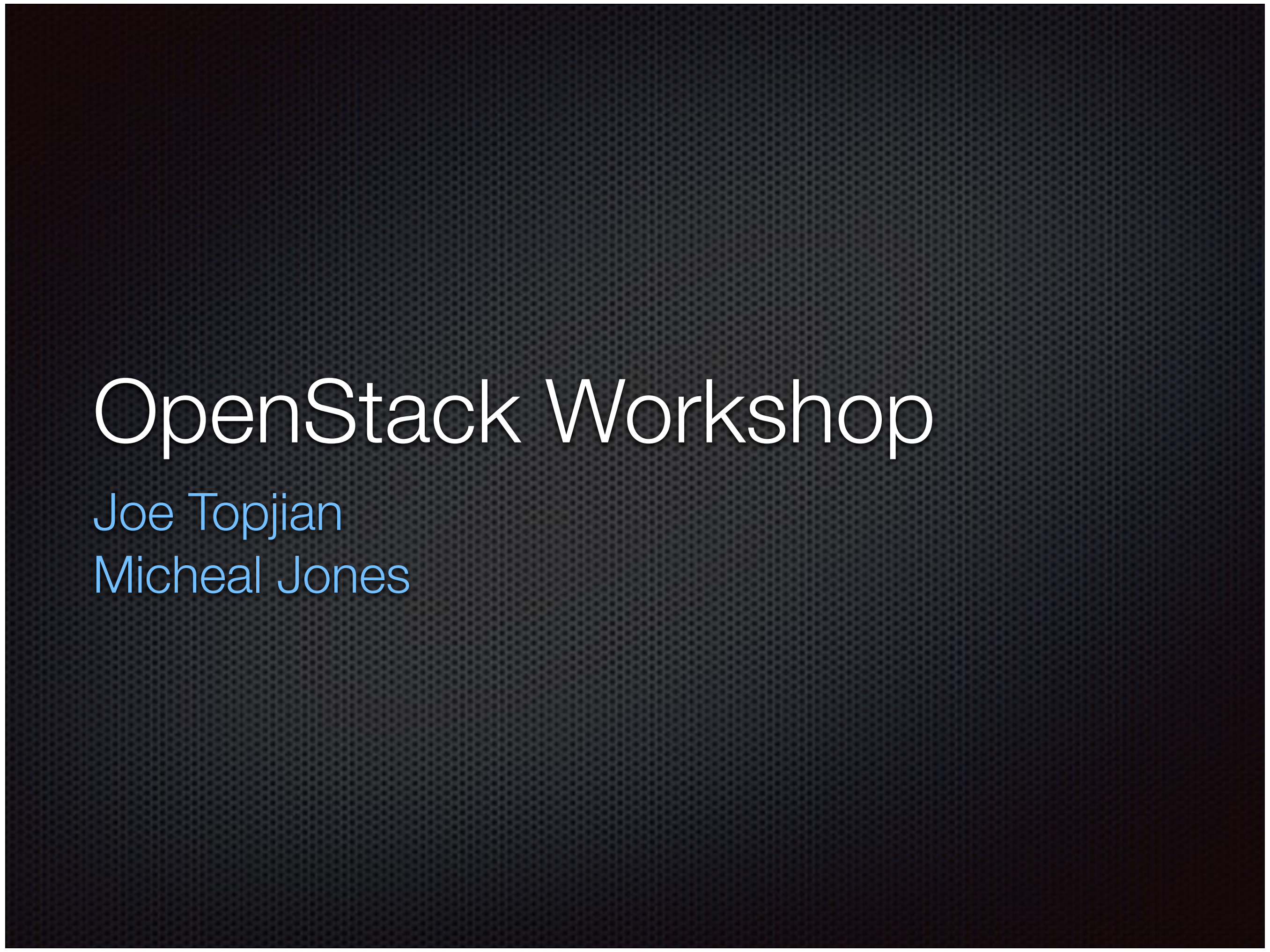


OpenStack Workshop

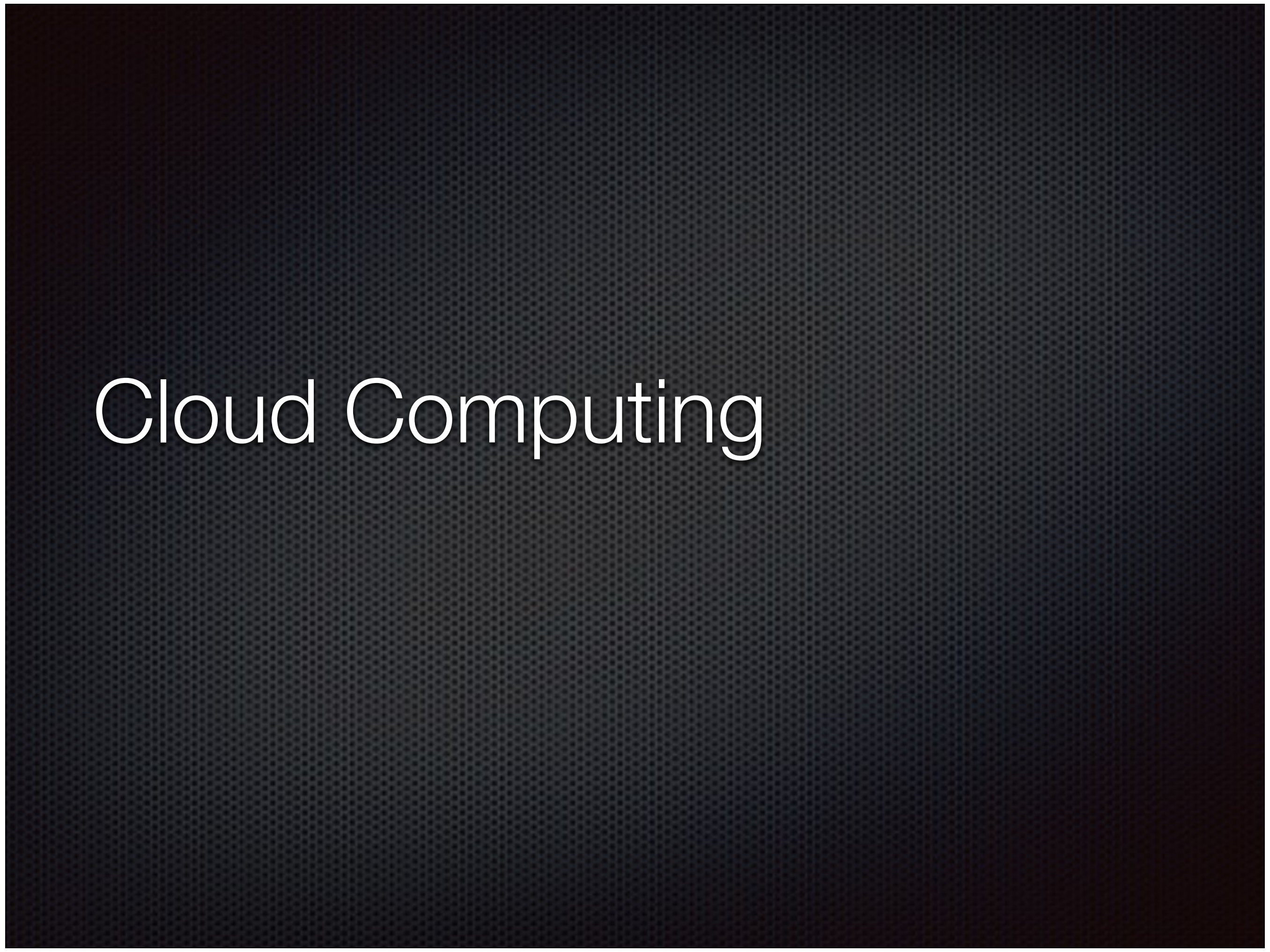
Joe Topjian
Micheal Jones

Agenda

- 09:00 - 10:00 - Introduction to Cloud and OpenStack
- 10:00 - 10:30 - Coffee
- 10:30 - 12:00 - OpenStack Tools Interactive Demos
- 12:00 - 13:00 - Lunch
- 13:00 - 14:00 - CyberSKA Visualization Demo and QA

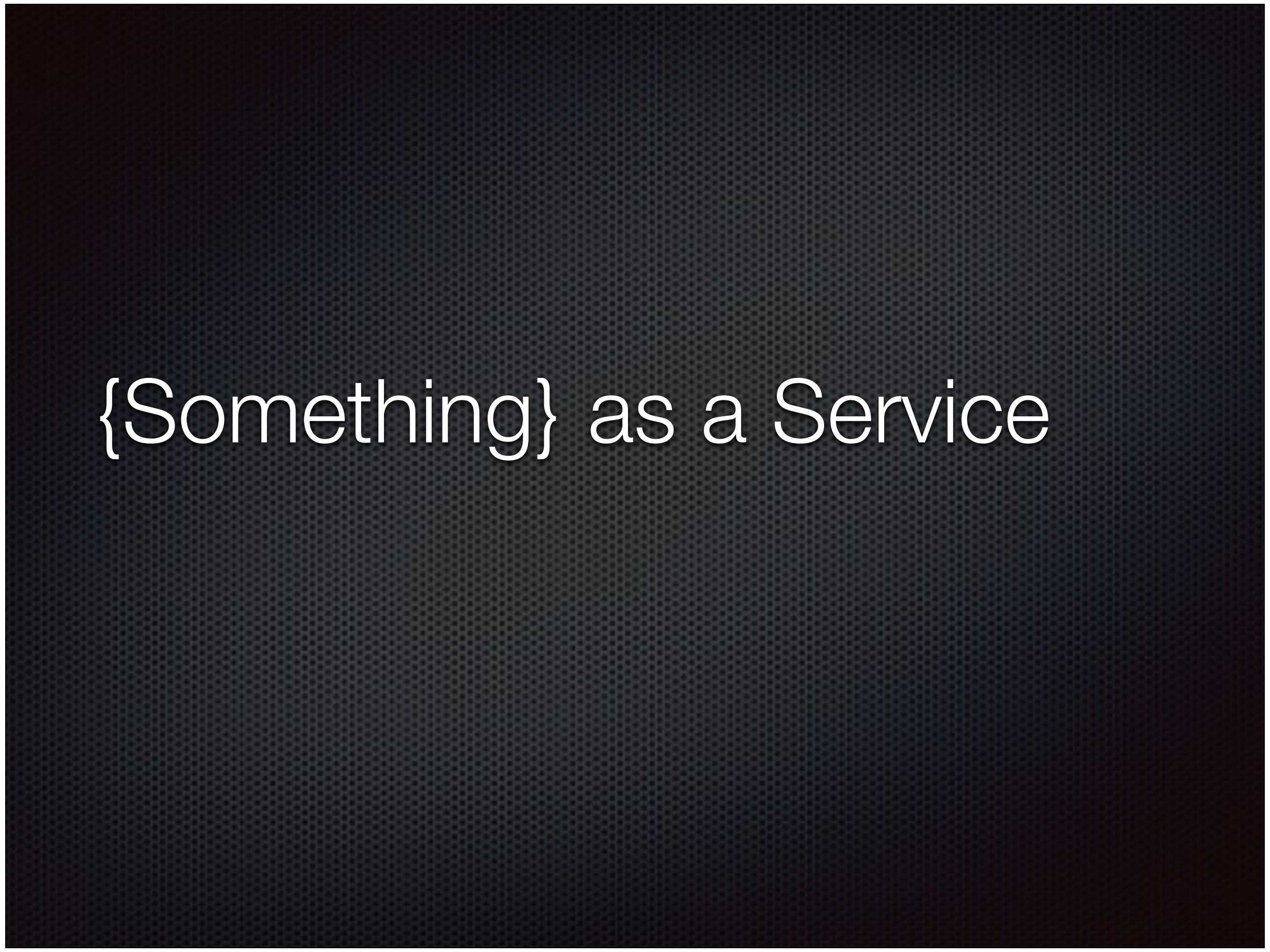
Introduction to Cloud and OpenStack

The Quick Start Edition



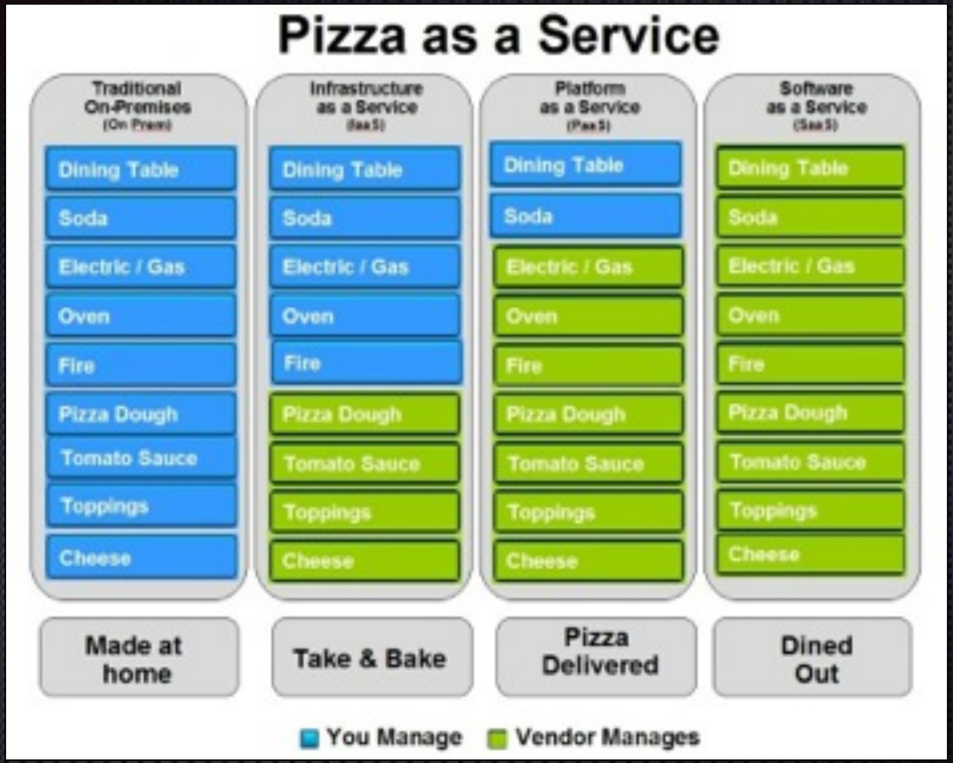
Cloud Computing

An overly generalized definition of Cloud Computing is the pooling of resources together (compute, disk, network, etc.) and giving them out on as they are actually needed. So we can take the resources we need, when we need it.



{Something} as a Service

So how does it work? It means as a user you'll using something as service and everything else below what you care about someone else will take care of.



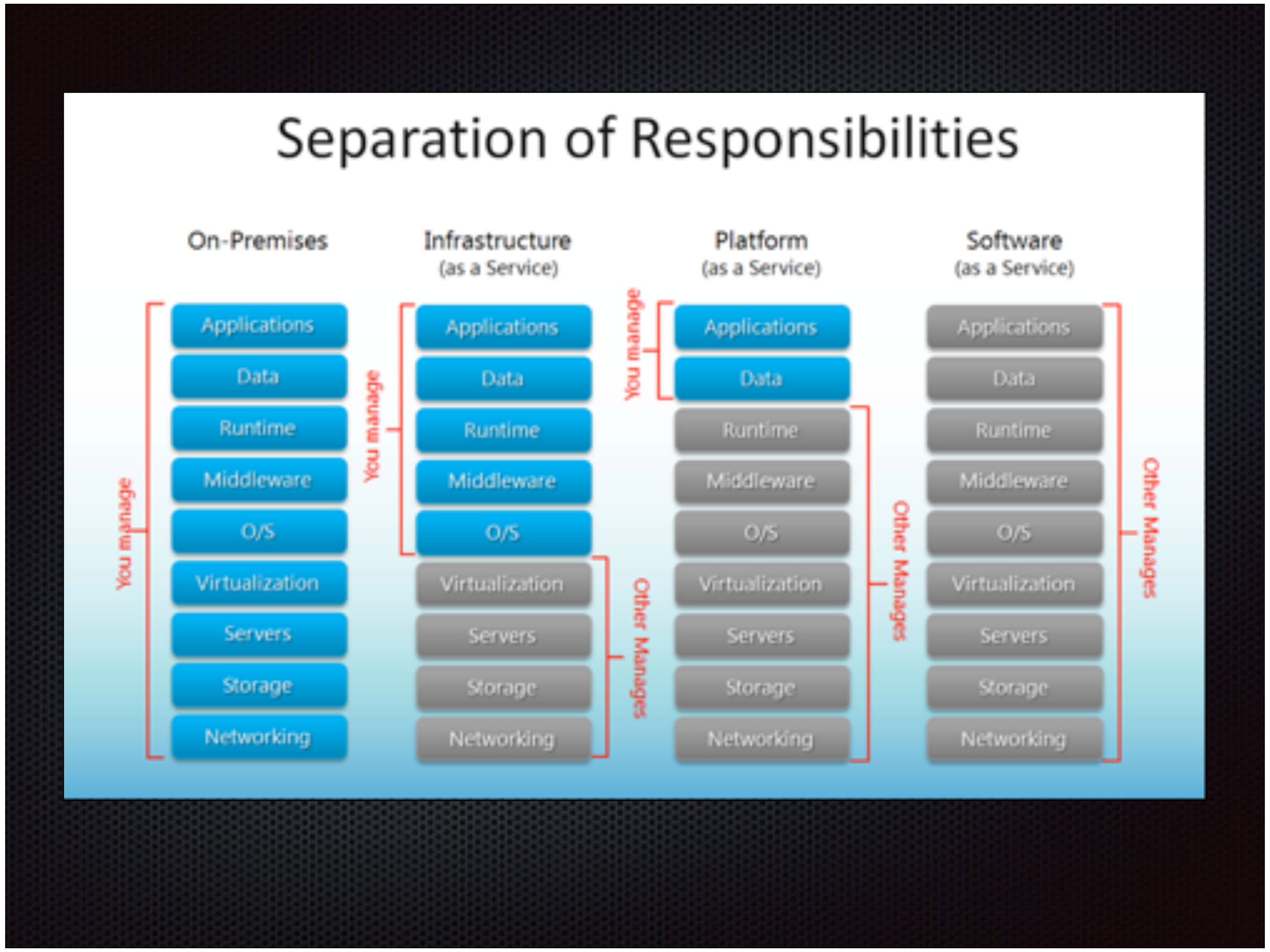
Pizza as a Service

Traditional On-Premises (On Prem)	Infrastructure as a Service (IaaS)	Platform as a Service (PaaS)	Software as a Service (SaaS)
🟦 Dining Table	🟦 Dining Table	🟦 Dining Table	🟩 Dining Table
🟦 Soda	🟦 Soda	🟦 Soda	🟩 Soda
🟦 Electric / Gas	🟦 Electric / Gas	🟩 Electric / Gas	🟩 Electric / Gas
🟦 Oven	🟦 Oven	🟩 Oven	🟩 Oven
🟦 Fire	🟦 Fire	🟩 Fire	🟩 Fire
🟦 Pizza Dough	🟩 Pizza Dough	🟩 Pizza Dough	🟩 Pizza Dough
🟦 Tomato Sauce	🟩 Tomato Sauce	🟩 Tomato Sauce	🟩 Tomato Sauce
🟦 Toppings	🟩 Toppings	🟩 Toppings	🟩 Toppings
🟦 Cheese	🟩 Cheese	🟩 Cheese	🟩 Cheese
Made at home	Take & Bake	Pizza Delivered	Dined Out

🟦 You Manage 🟩 Vendor Manages

https://www.linkedin.com/today/post/article/20140730172610-9679881-pizza-as-a-service

If we think of it in terms of food we can see what we as users need to manage in blue in order to have some pizza. The full meal deal if we have our own server, to Software as a Service with is like Dining Out.



Separation of Responsibilities

On-Premises

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

You manage

Infrastructure
(as a Service)

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

You manage

Other Manages

Platform
(as a Service)

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

You manage

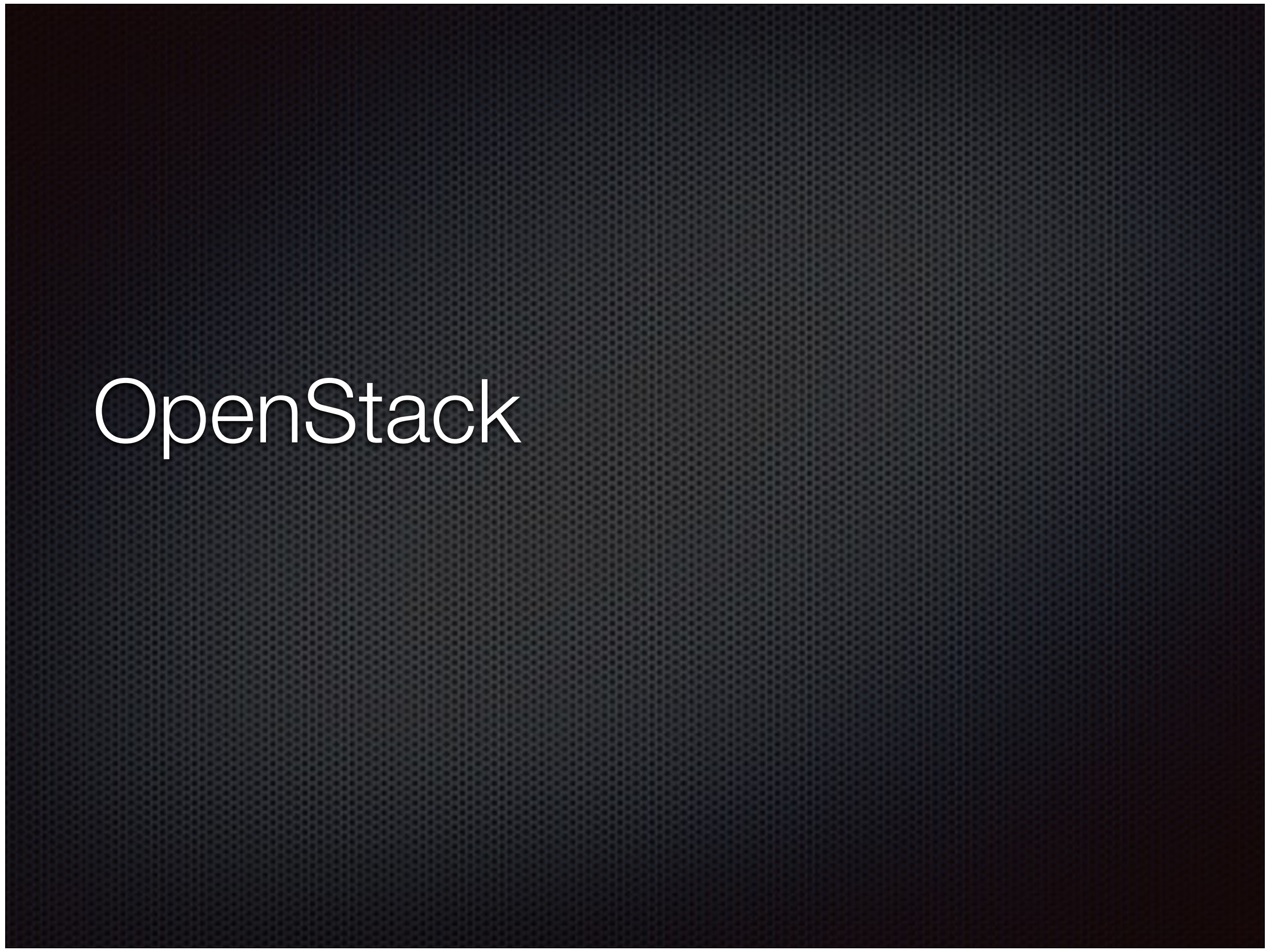
Other Manages

Software
(as a Service)

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

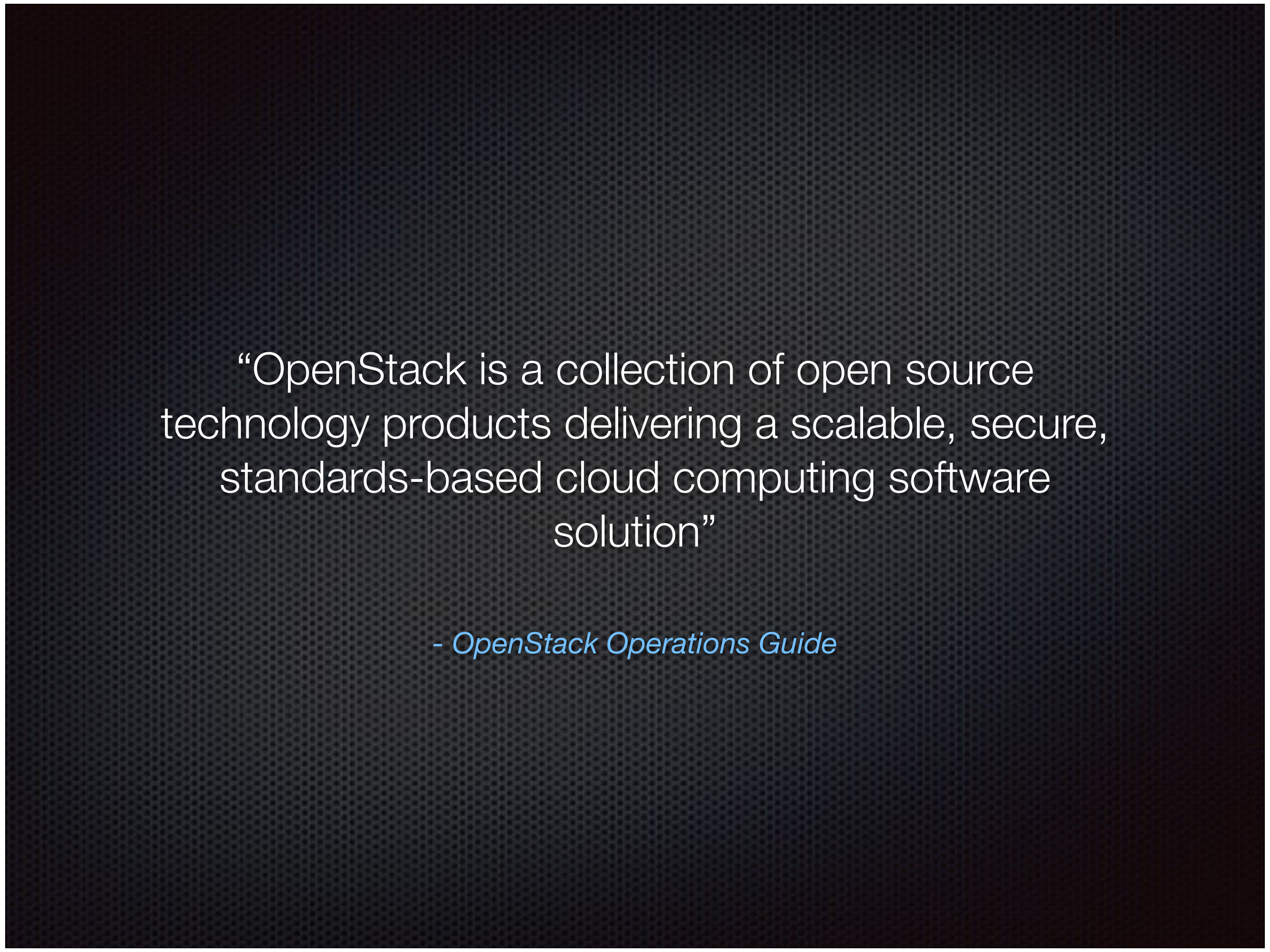
Other Manages

Subsequently - the actual hardware stack



OpenStack

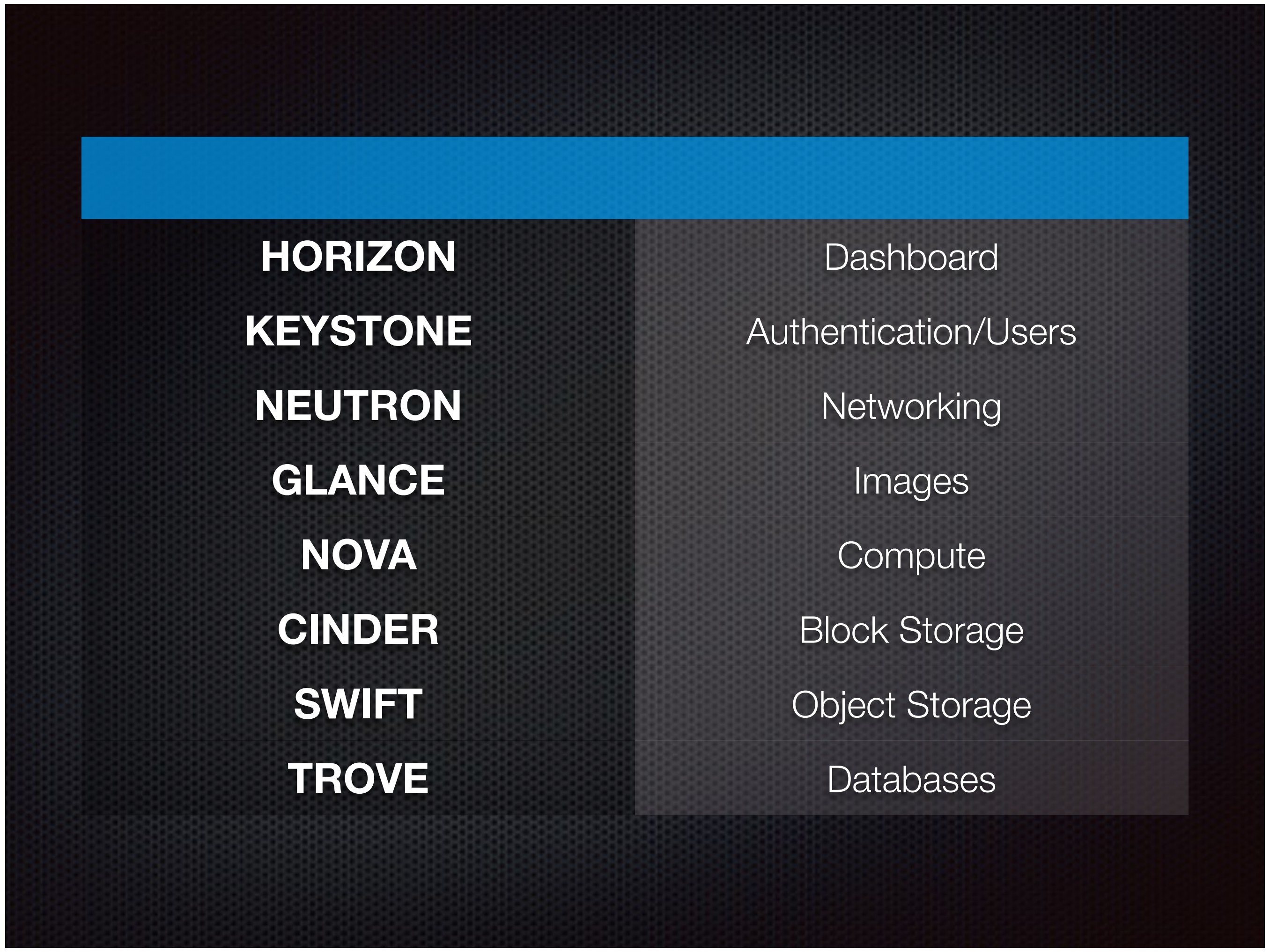
OpenStack has been around since 2010 when NASA and Rackspace created a joint project.



> "OpenStack is a collection of open source technology products delivering a scalable, secure, standards-based cloud computing software solution"
>
> *- OpenStack Operations Guide*

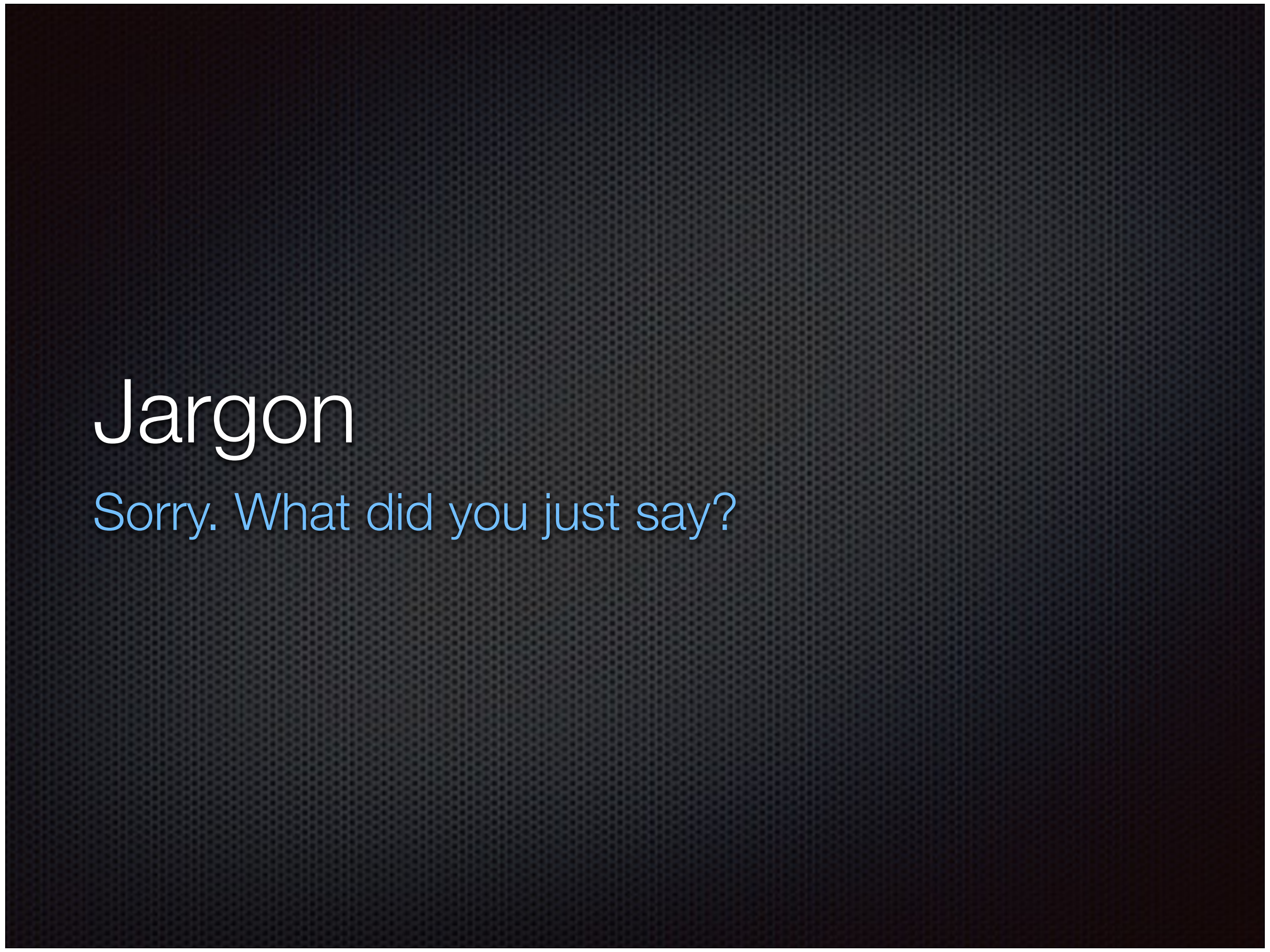
I like this description because it accurately describes everything OpenStack does in an incredibly brief sentence.
It leverages individual pieces and products and brings them together. eg. You can choose which hypervisor you want, how your storage is set up, how your networking is set up.

Think of it as an API or SDK. It's not a hypervisor, storage system, etc. It leverages those.



HORIZON	Dashboard
KEYSTONE	Authentication/Users
NEUTRON	Networking
GLANCE	Images
NOVA	Compute
CINDER	Block Storage
SWIFT	Object Storage
TROVE	Databases

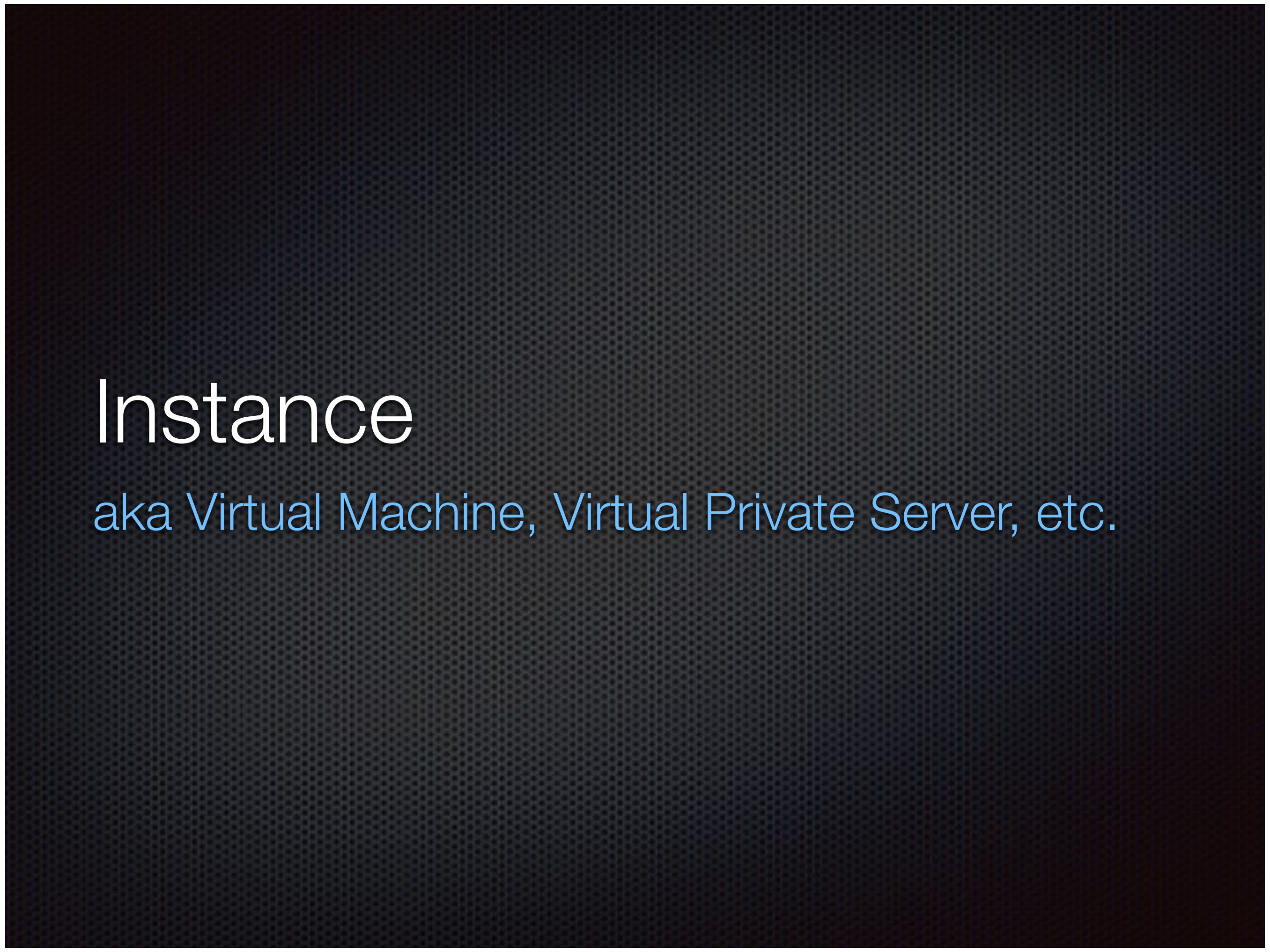
OpenStack components have different names and we’ll refer to some. Just because something is powered by OpenStack doesn’t means it will have all of these components in use or available.



Jargon

Sorry. What did you just say?

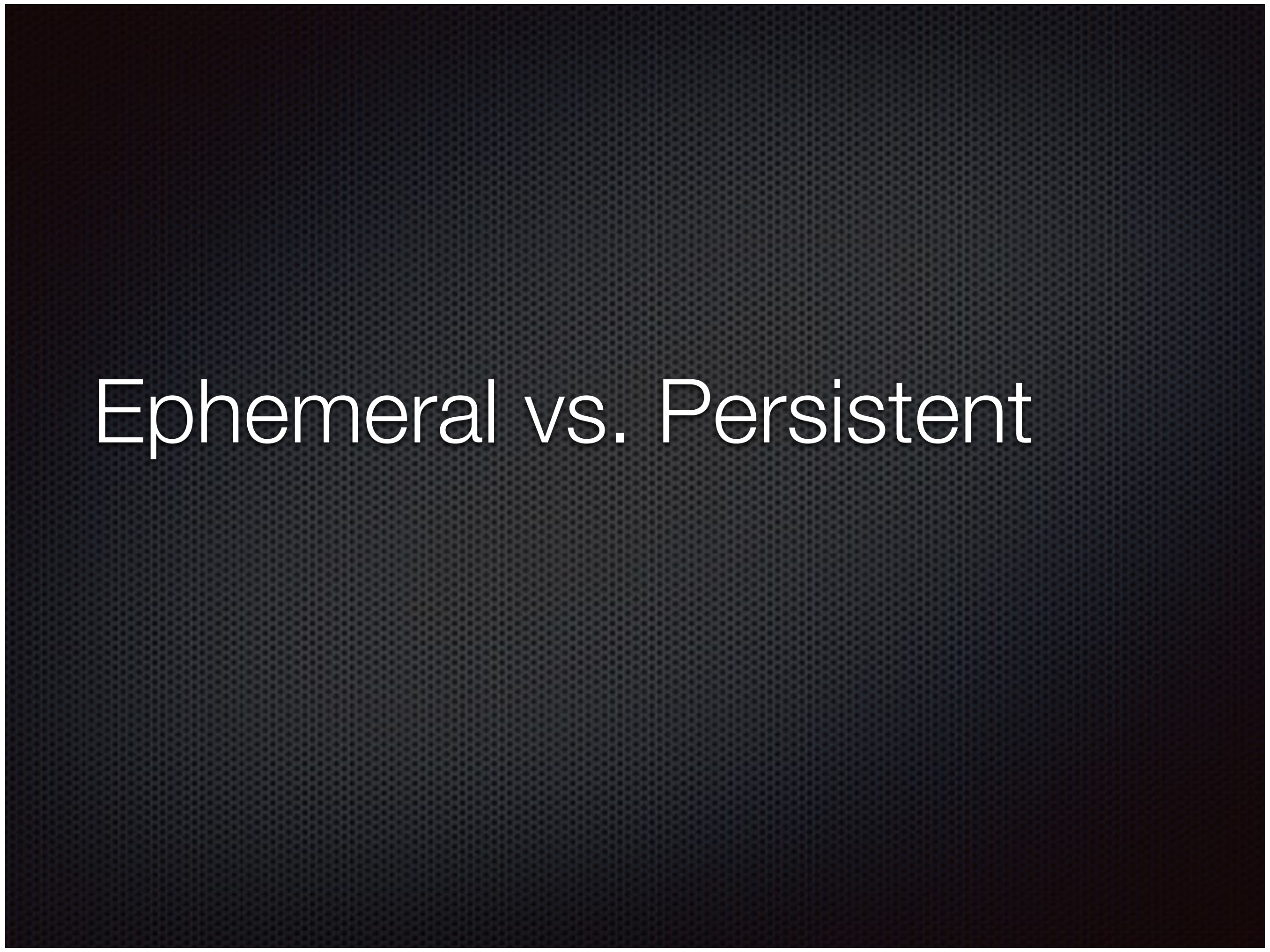
Run down of some jargon we will be using and some important concepts for the next portion of our talk.



Instance

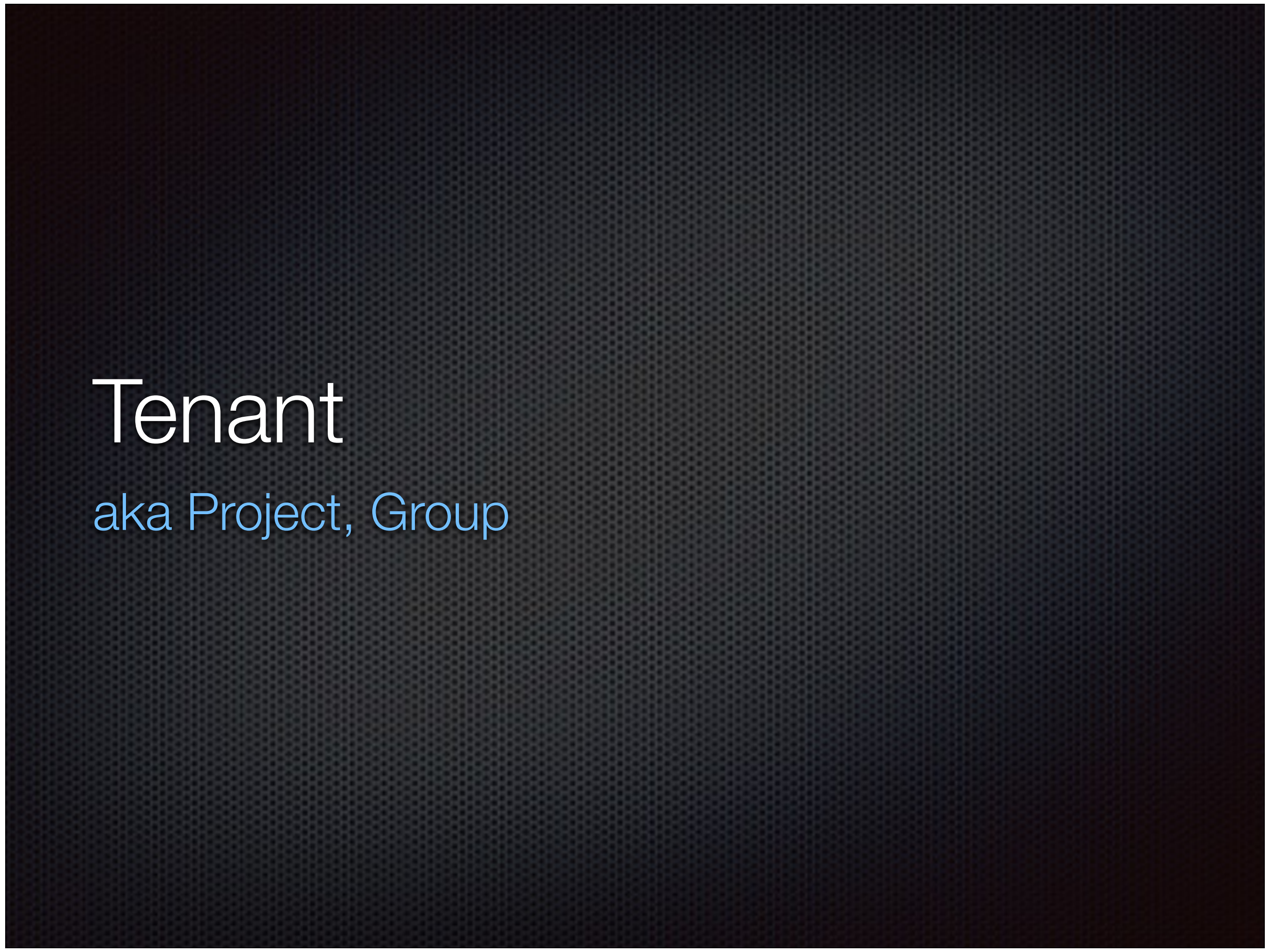
aka Virtual Machine, Virtual Private Server, etc.

Run down of some jargon we will be using and some important concepts for the next portion of our talk.



Ephemeral vs. Persistent

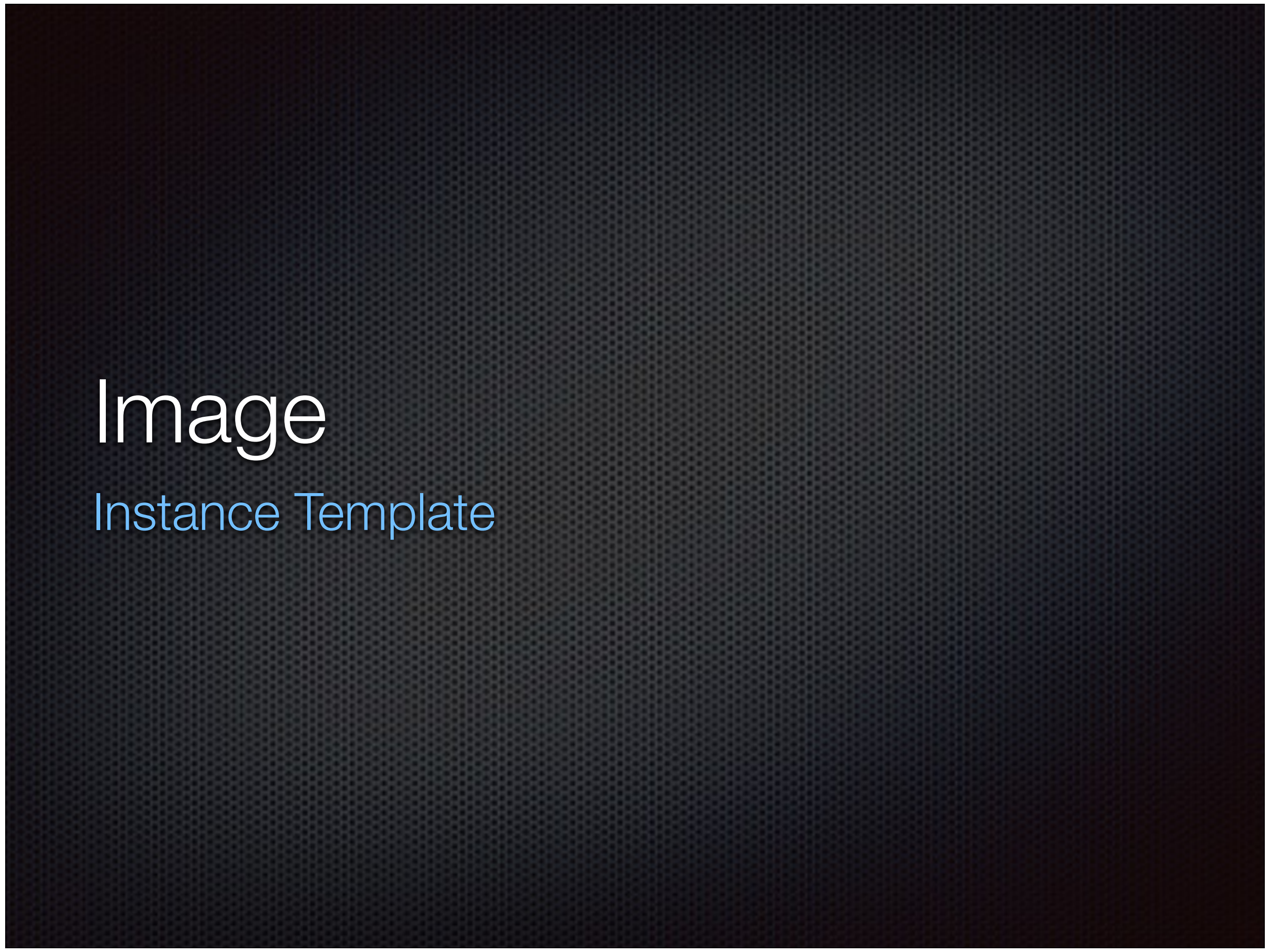
One thing to note - you'll see a difference between ephemeral and persistent mentioned. Ephemeral means that the contents (eg. instance's hard drive) only stick around as long as the instance is around. Just like if it was only stored on a local computer. Throw away the computer, throw away everything on it unless you back it up.



Tenant

aka Project, Group

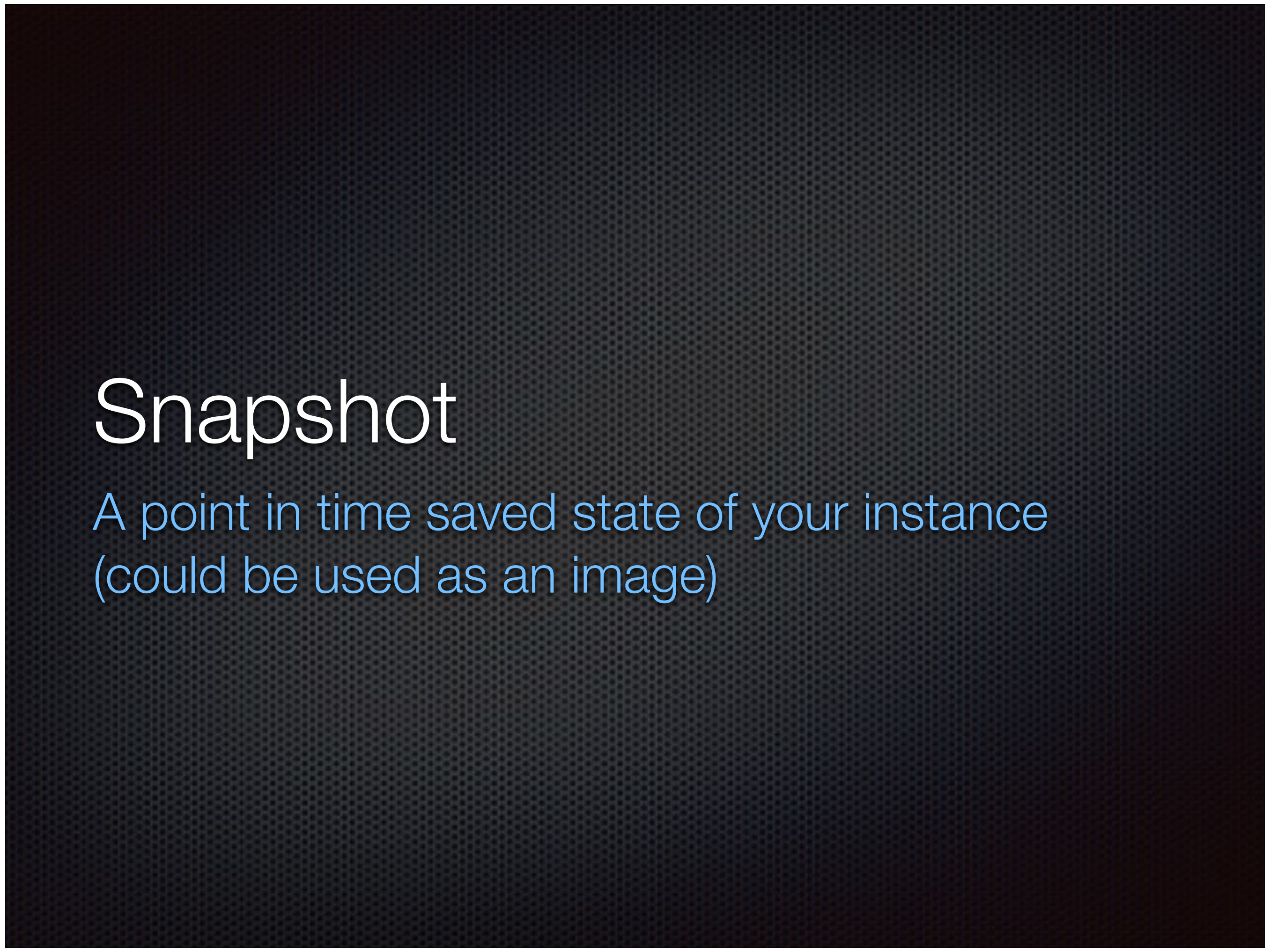
Tenant, Project, Group - the names are used quite interchangeably and leads to much confusion. Users belong to Tenants, as instances, volumes and other things can belong to Tenants or other times users.



Image

Instance Template

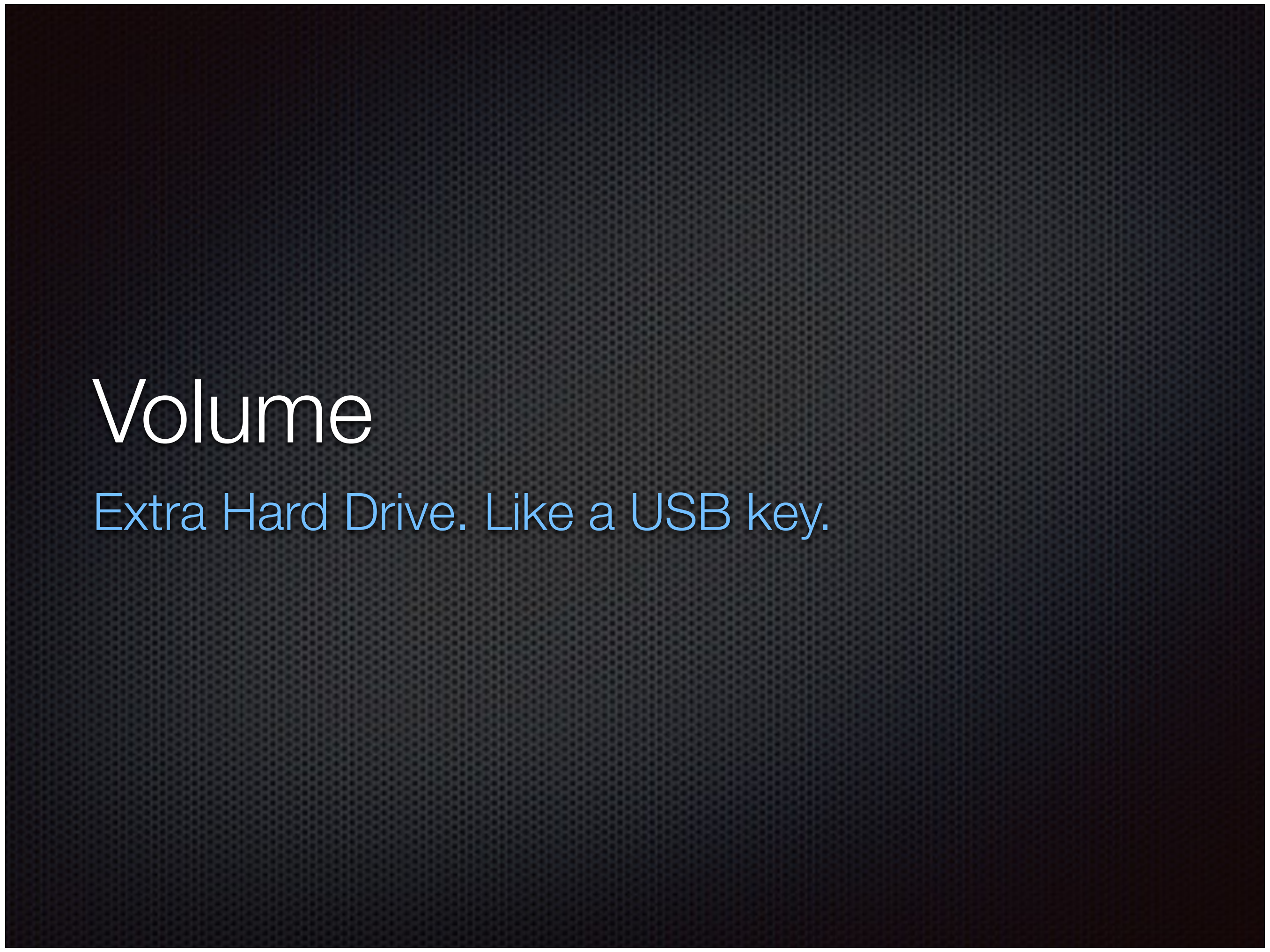
A virtual machine template. This can be something you create, something provided by an OS vendor, or something else entirely.



Snapshot

A point in time saved state of your instance
(could be used as an image)

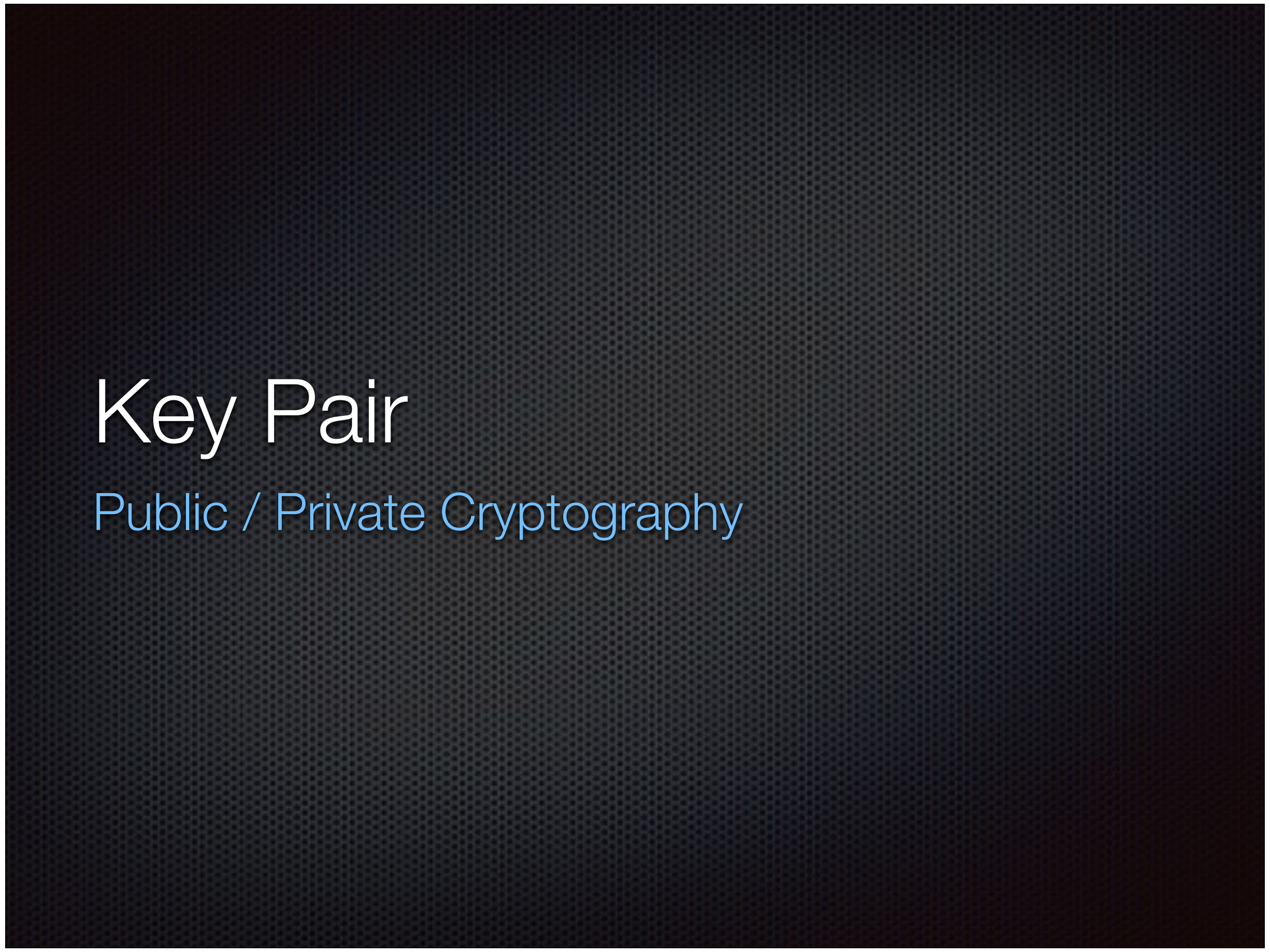
Run down of some jargon we will be using and some important concepts for the next portion of our talk.



Volume

Extra Hard Drive. Like a USB key.

Volumes give you additional storage that can be moved around. Think of it like a USB key. But faster and more water vapoury.



Key Pair

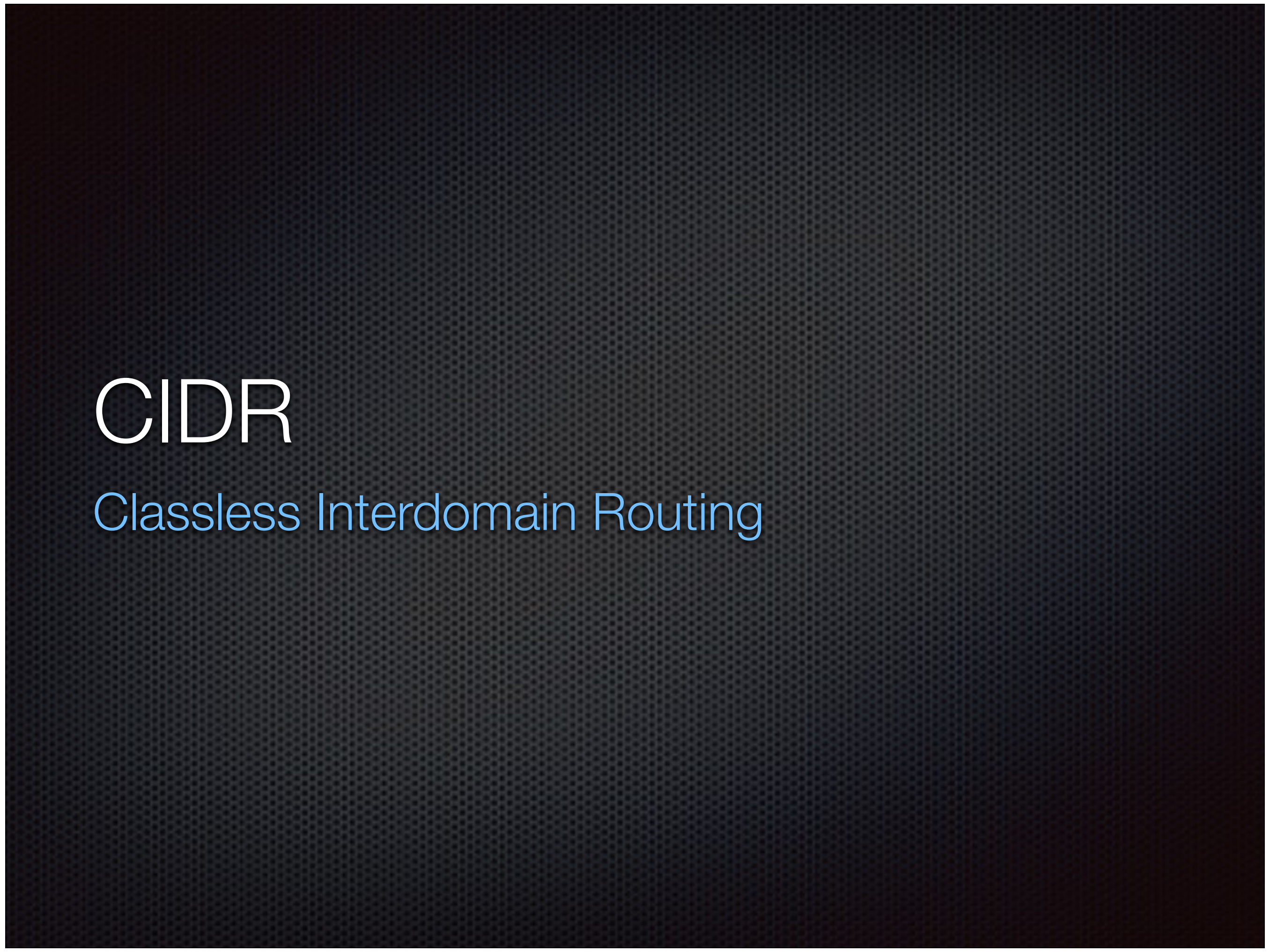
Public / Private Cryptography

Key pair is another term you'll hear quite heavily in the next section; instead of passwords you exchange keys to prove you should be able to log into the instance.

Security Group

Firewall

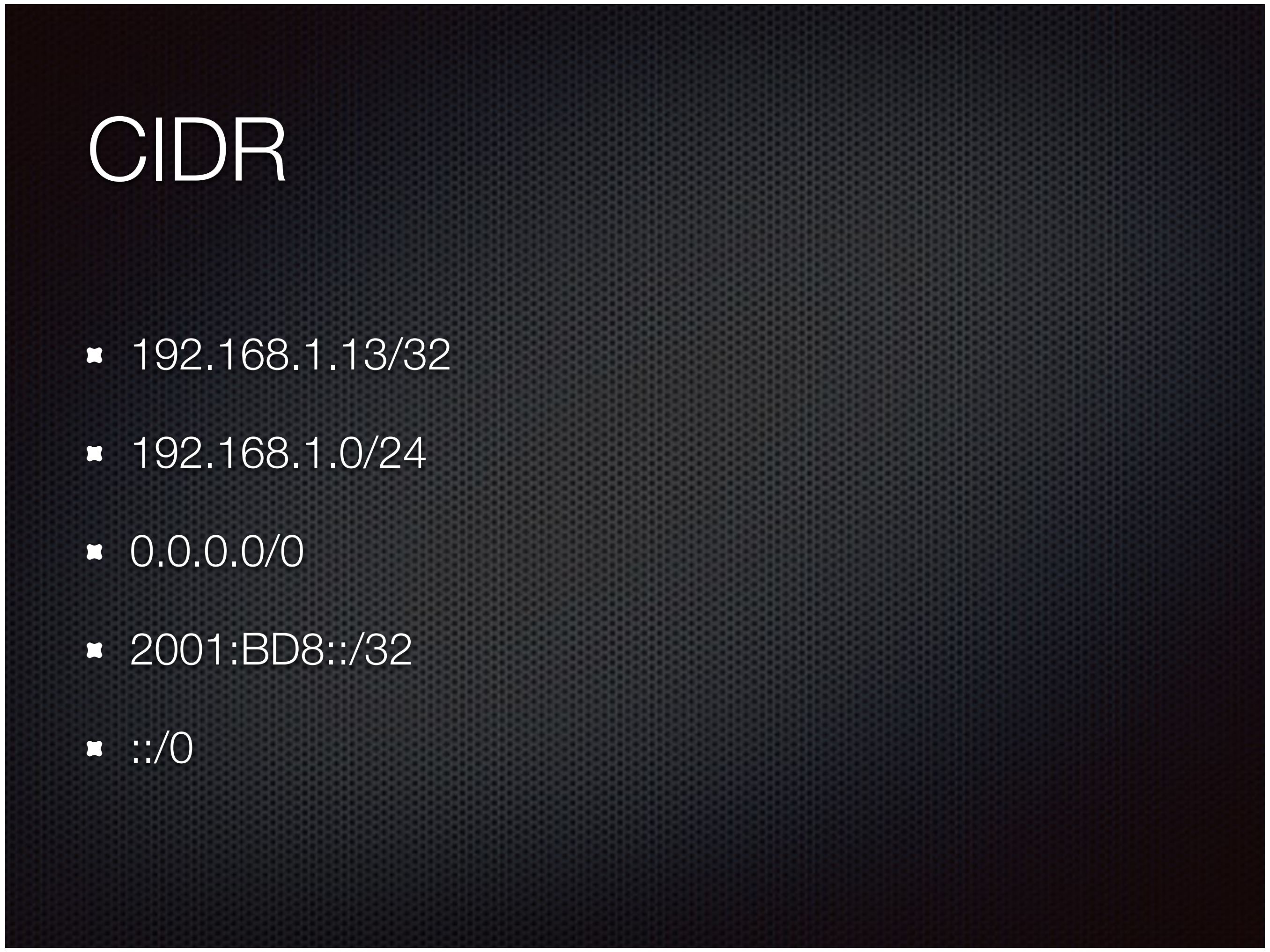
Security Groups play a very important role - they are the cloud’s firewall between your instance and the outside world and don’t let anything through by default



CIDR

Classless Interdomain Routing

Security Groups uses CIDR (Classless Inter-Domain Routing) rules to denote what IP addresses it should affect.



CIDR

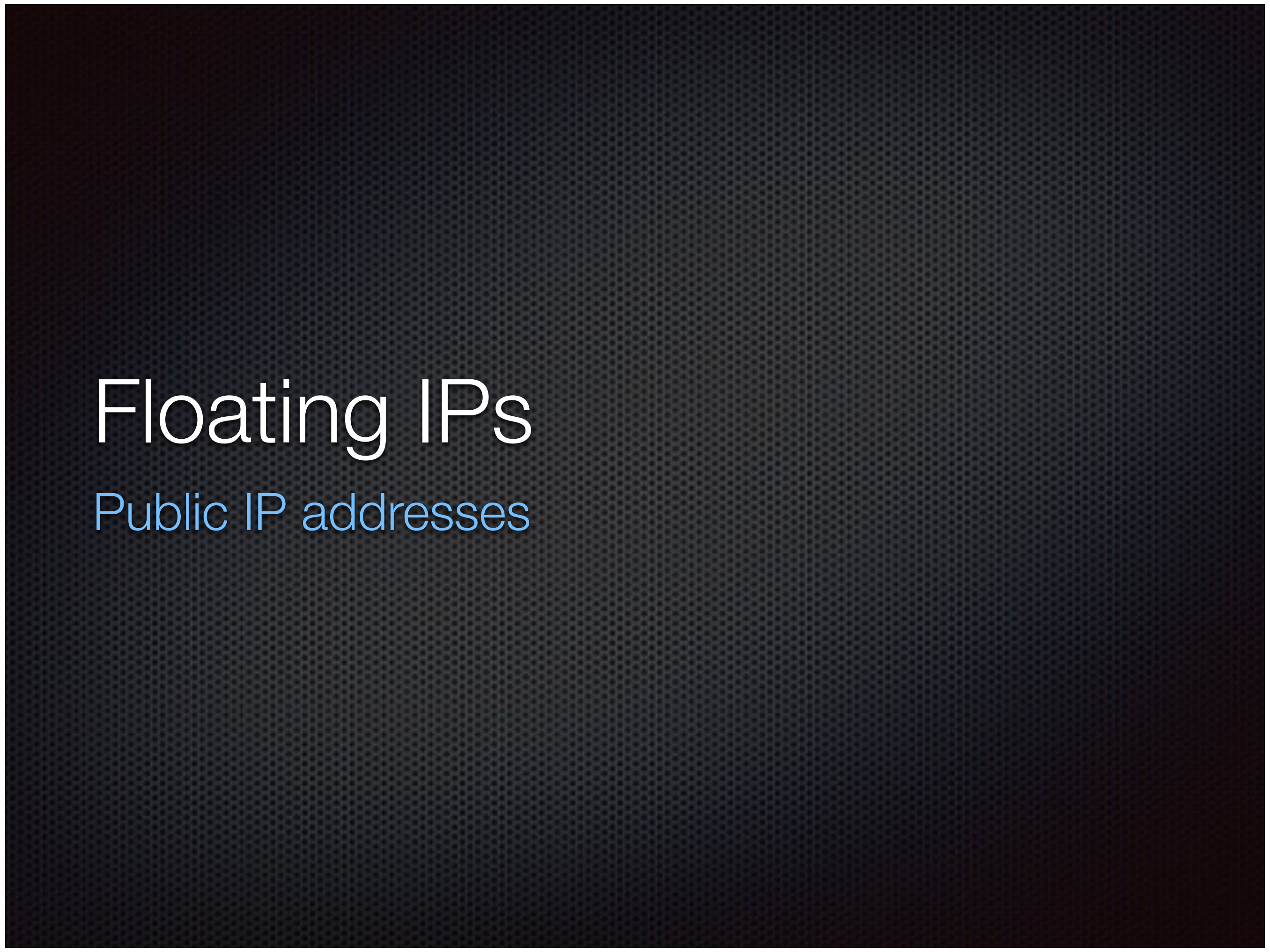
- 192.168.1.13/32
- 192.168.1.0/24
- 0.0.0.0/0
- 2001:BD8::/32
- ::/0

/32 is one IP

/24 is 255 IPs

0.0.0.0/0 for anyone.

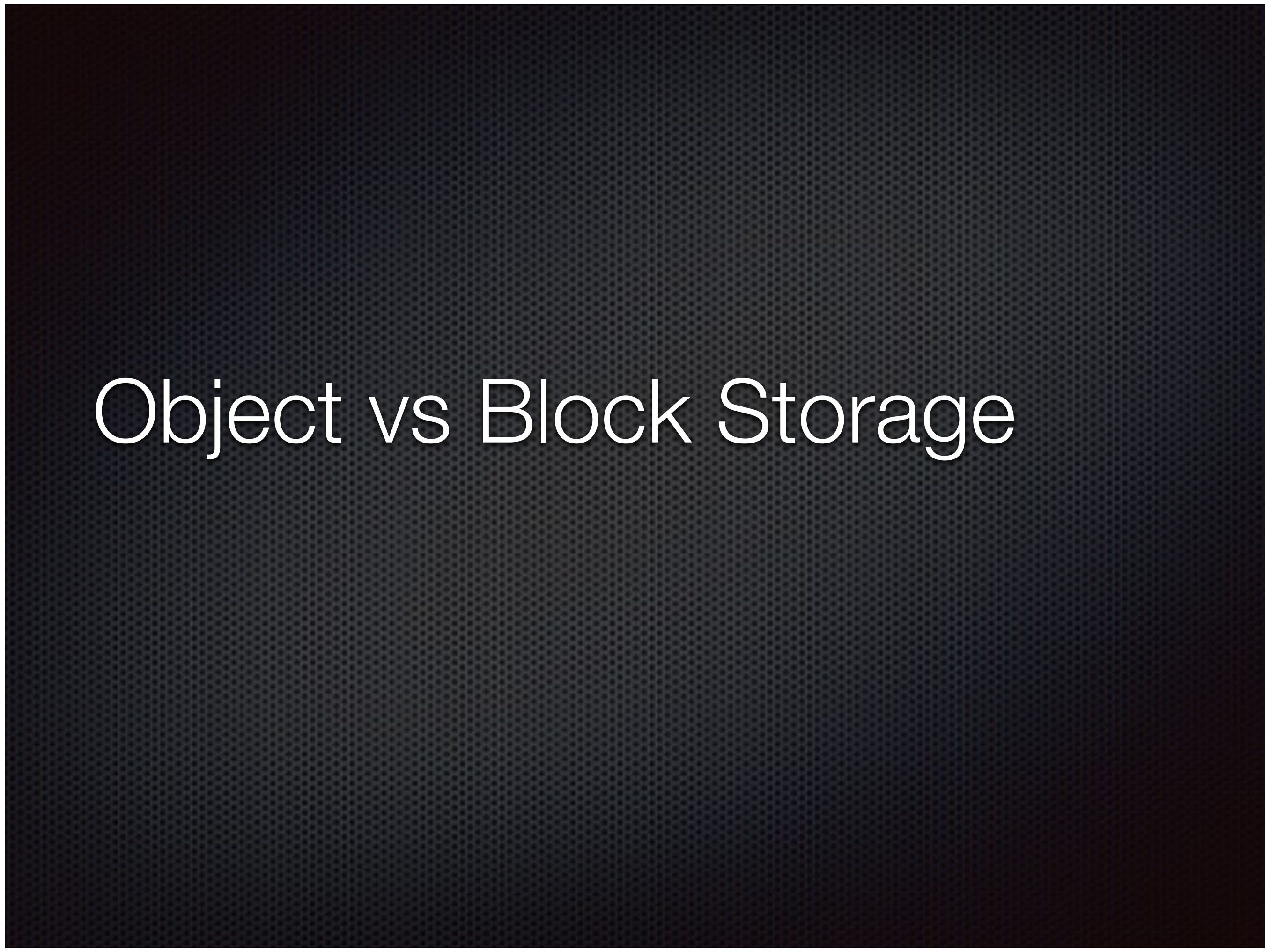
IPv6 ones look similar.



Floating IPs

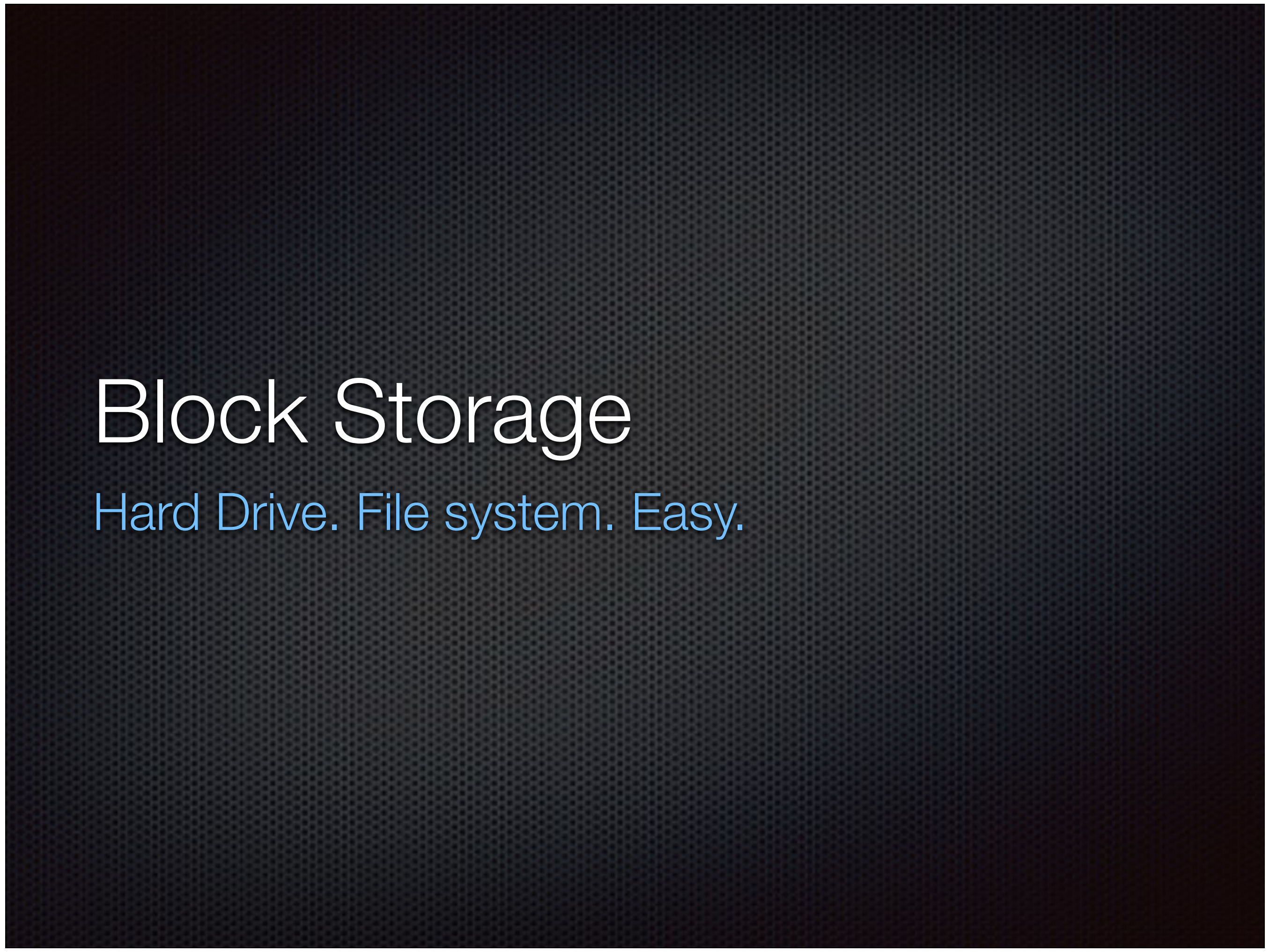
Public IP addresses

Like volumes, floating IPs are attached, detached and then reattached to instances. There’s also a limit on the number of public IPs available.



Object vs Block Storage

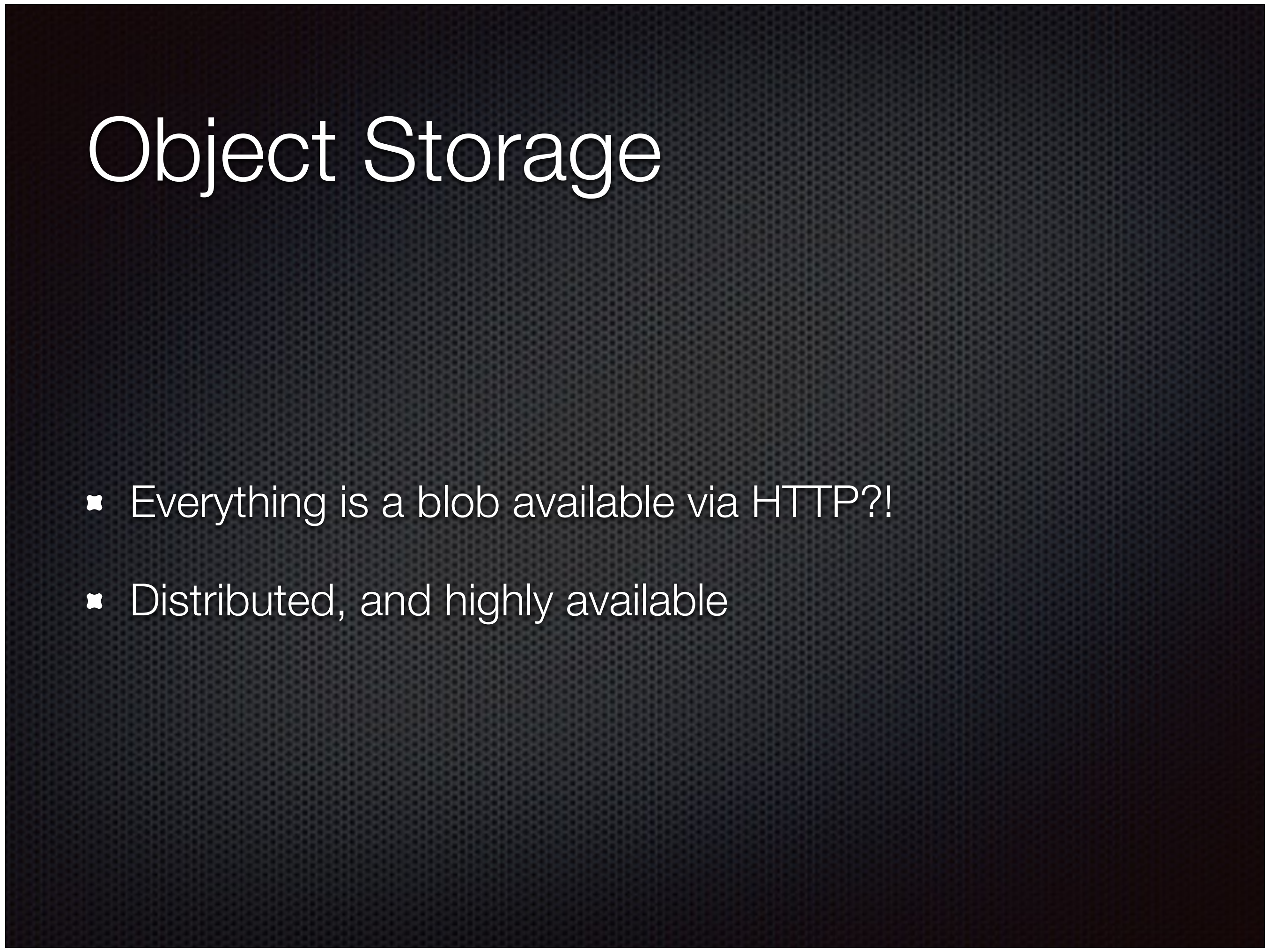
Before we move into the demo we’re going to take a moment to explain the difference between Object and Block Storage.



Block Storage

Hard Drive. File system. Easy.

Block Storage (Cinder) is exactly what you think about an external hard drive - you place files on a filesystem, sort them in folders, manage them. If you want to share them you need to either set up some sharing system (eg. NFS) and otherwise back them up as there is only one copy.

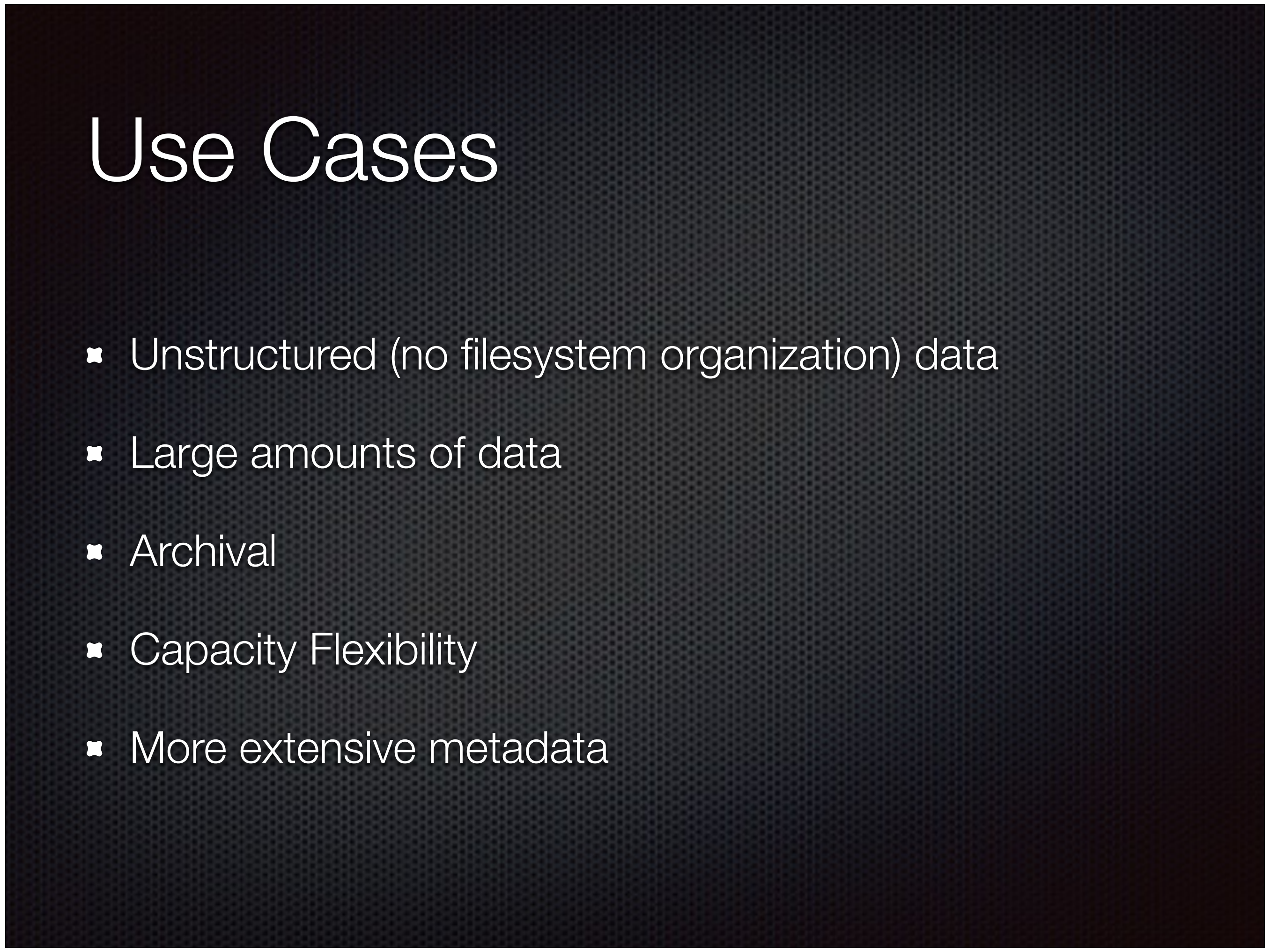


Object Storage

- Everything is a blob available via HTTP?!
- Distributed, and highly available

Object Storage is a completely different take - everything you put on Object Storage becomes a blob or object you can access via an HTTP call. It’s now a shared storage system, an easy place to store files publicly, and much more!

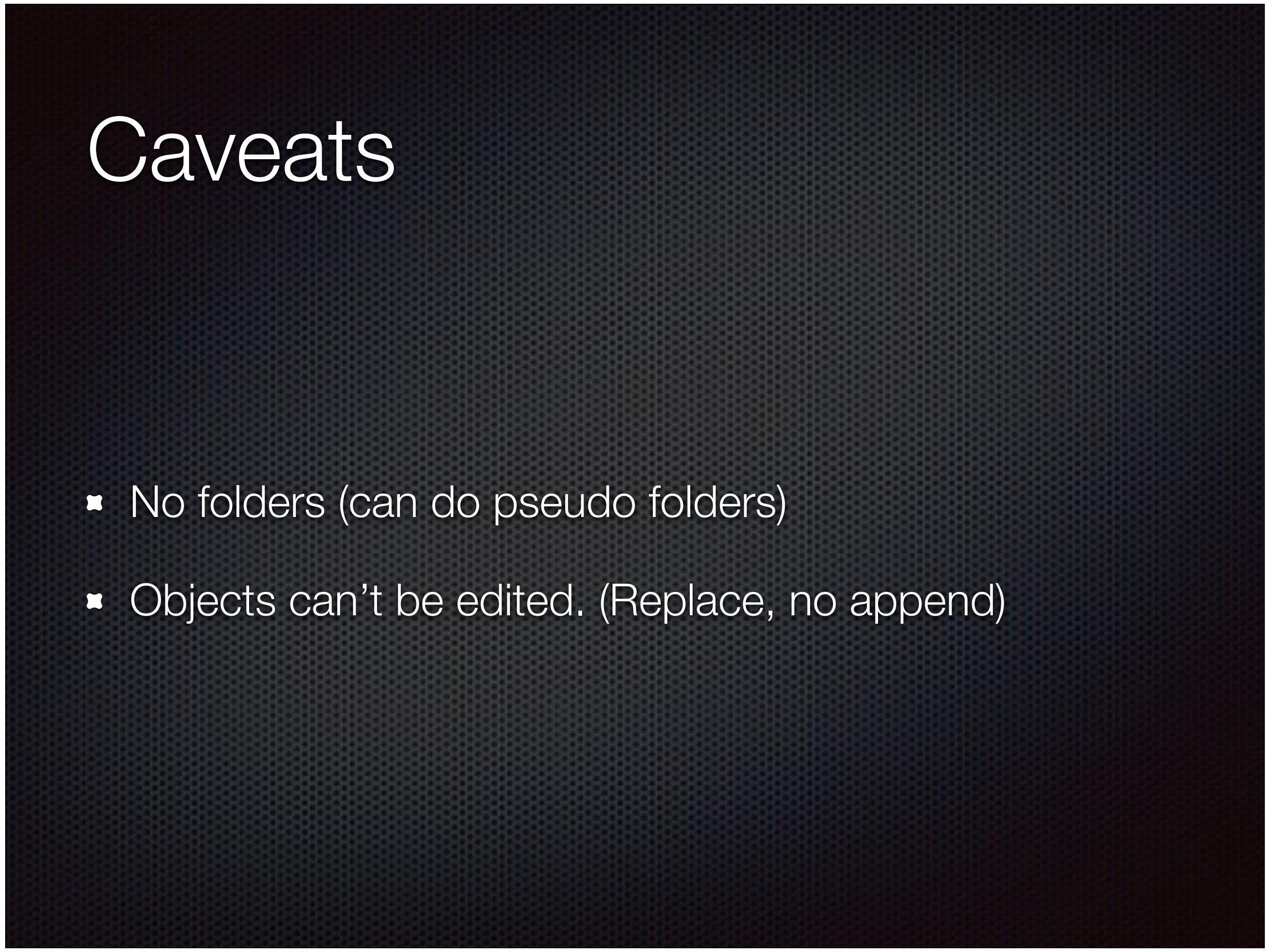
The other major difference versus block storage is it’s distributed as the system behind the scenes will keep 3 copies at all times and is constantly checking them to see if the copy they have is correct.



Use Cases

- Unstructured (no filesystem organization) data
- Large amounts of data
- Archival
- Capacity Flexibility
- More extensive metadata

Works best with “unstructured” data - data that doesn't need to managed, categorized or otherwise sorted **on the filesystem**



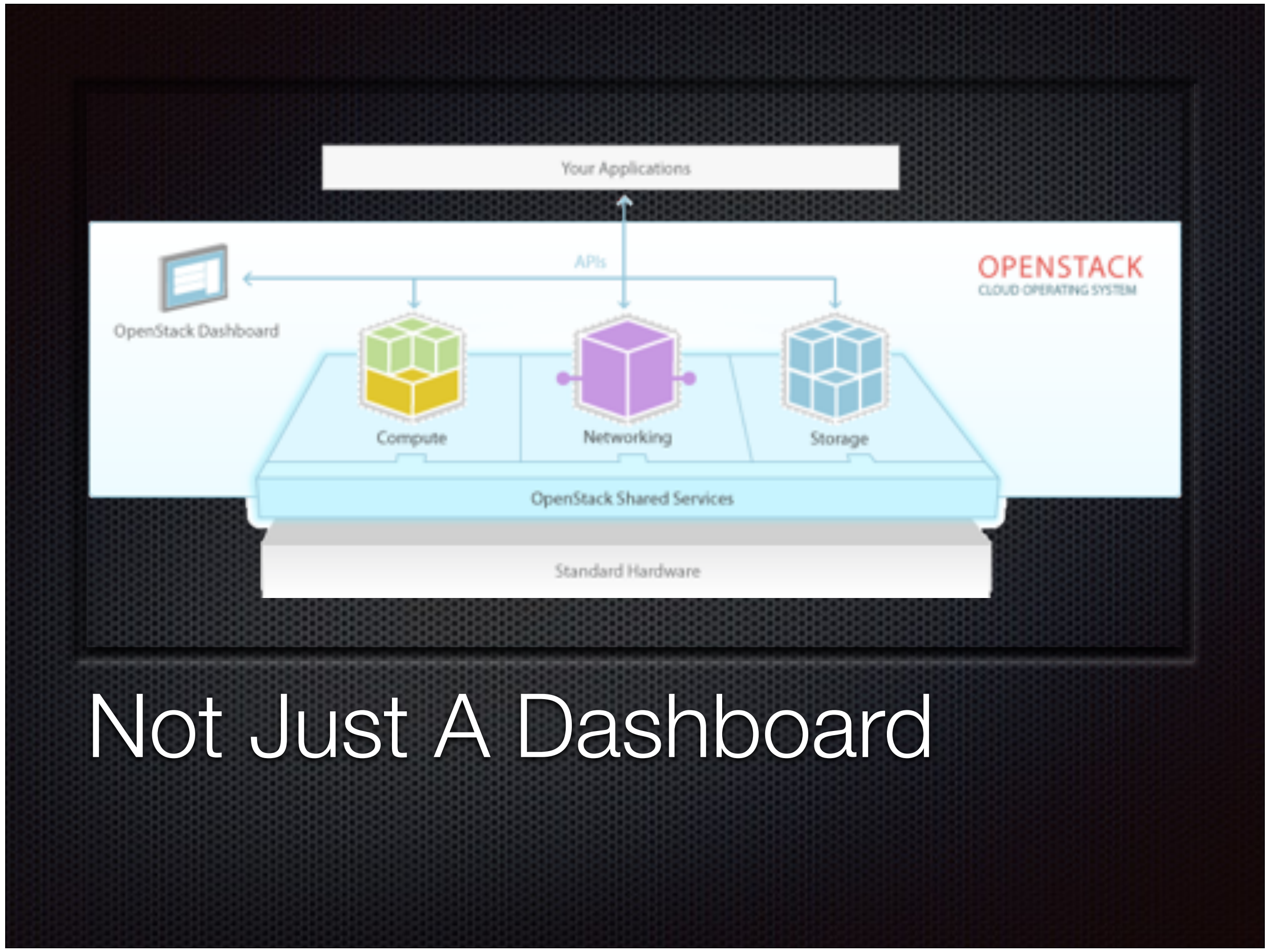
Caveats

- No folders (can do pseudo folders)
- Objects can’t be edited. (Replace, no append)

Works best with “unstructured” data - data that doesn't need to managed, categorized or otherwise sorted **on the filesystem**

Dashboard Tour

The Good Stuff



Not Just A Dashboard

As we mentioned before OpenStack is an SDK and API as well. Horizon - the dashboard we just ran through uses all the same API calls you could do in your own application or using the command line clients that are available.

CLI Tour

The Good Stuff

OpenStack Tools Interactive Demos

http://github.com/cybera/cyberska-workshop

CyberSKA Visualization Demo and QA

Questions?