Taming the Cloud Database with Apache jclouds

http://j.mp/acjdb14

Introductions

- Zack Shoylev
  - irc: zacksh twitter: @zackshoylev

freenode #jclouds

Also email!

Introductions

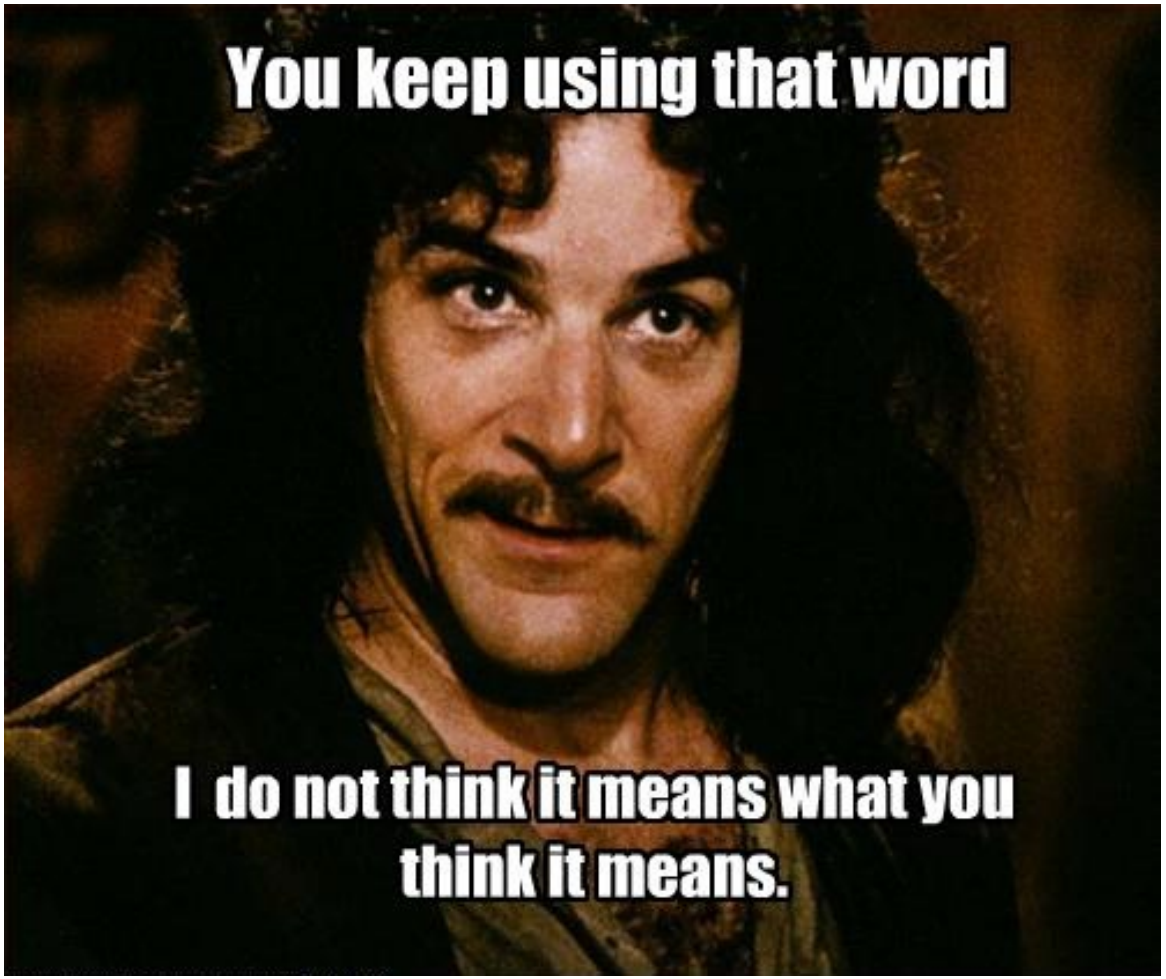
Developer Relations Group

https://developer.rackspace.com/support/

Goals

- jclouds
- Create a database in the cloud
- Abstractions and how to contribute

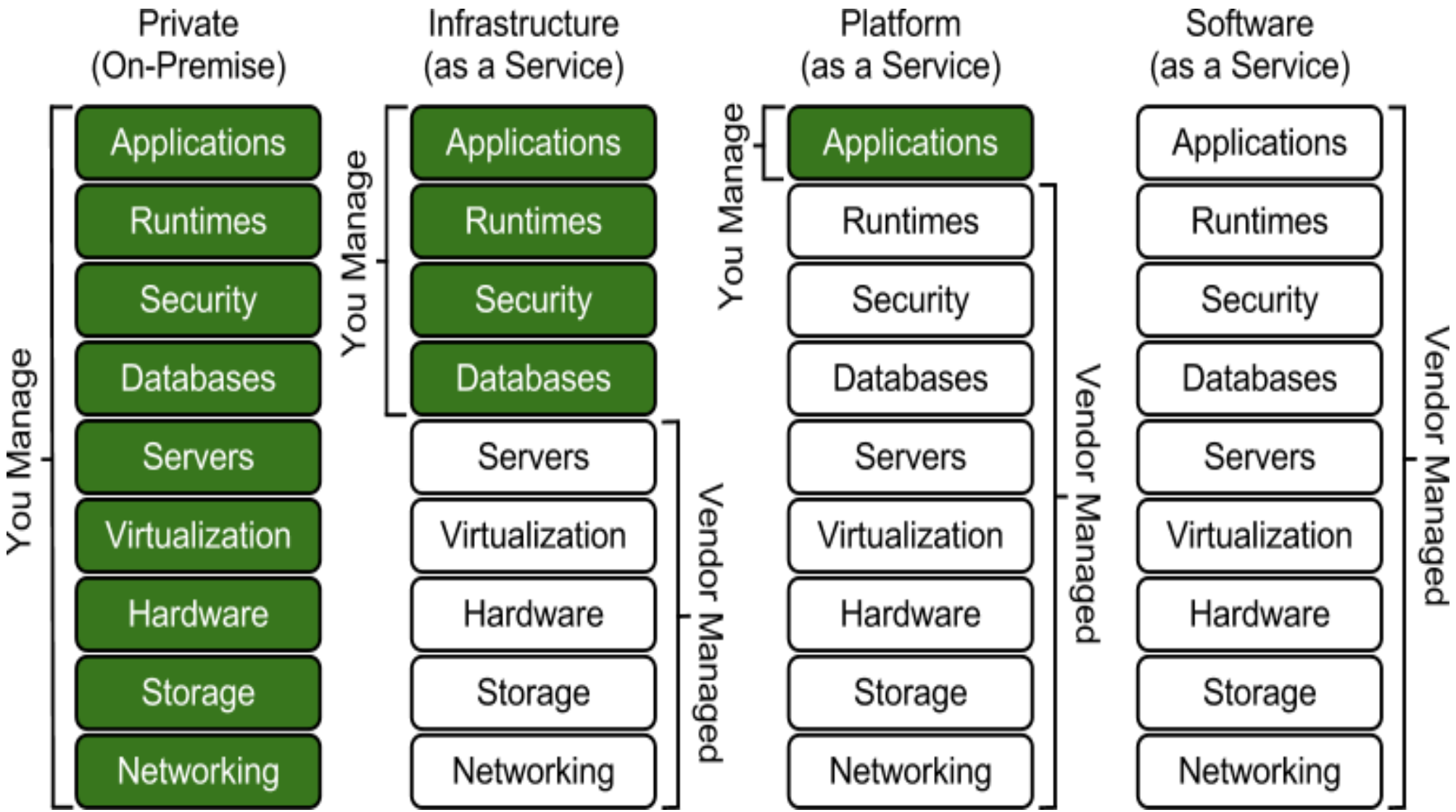
The Cloud


You keep using that word
I do not think it means what you think it means.

The Cloud

- Buzzword
- Networked and distributed computing
- Variety of services
  - Compute (servers)
  - Storage (files)
  - Databases
  - Email
  - ...

The Cloud



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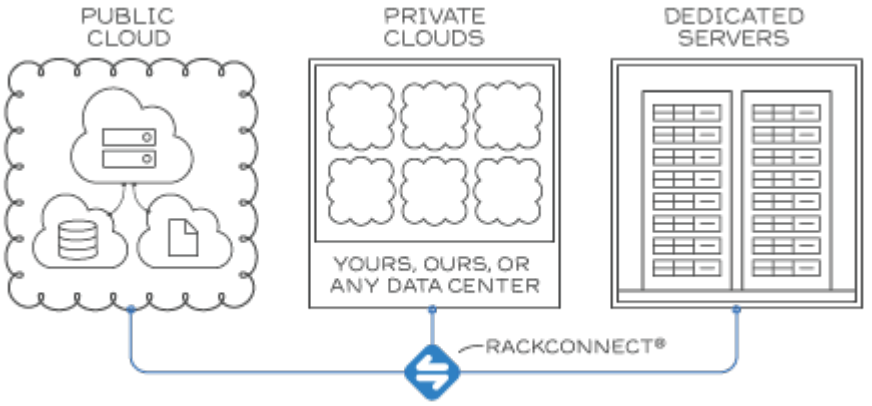
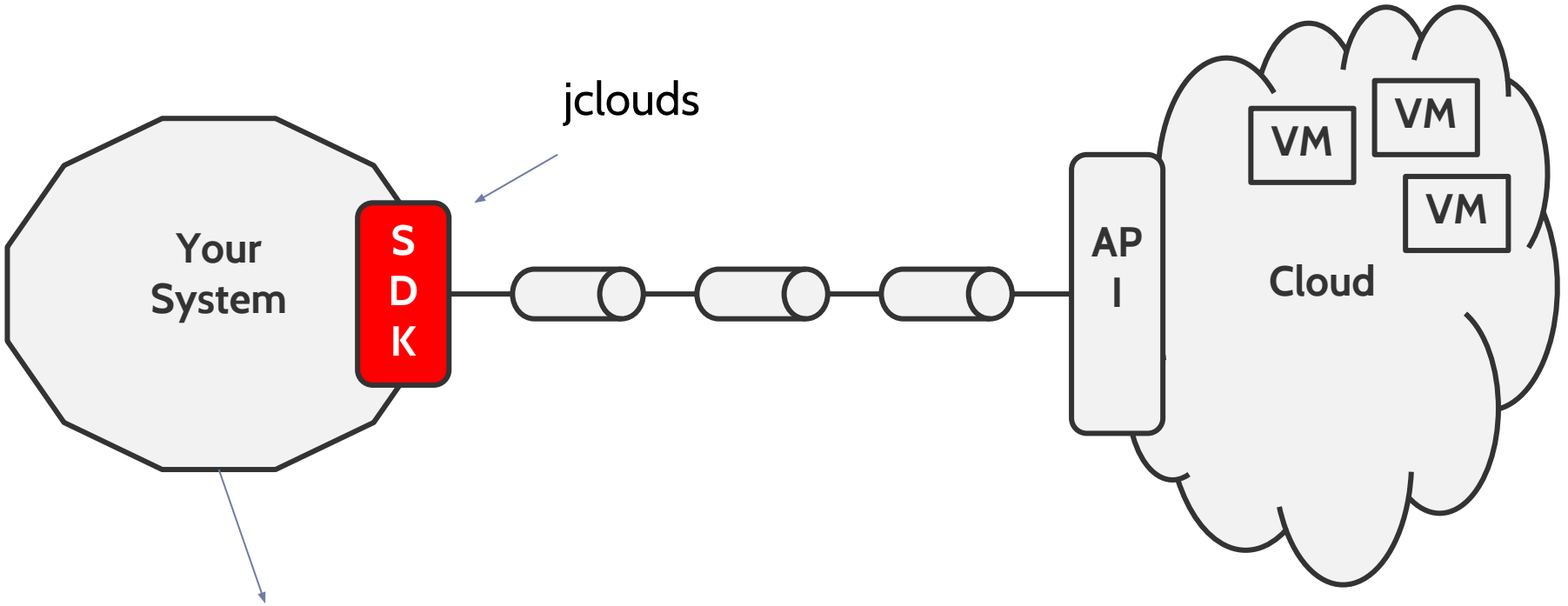
The Cloud

- Public cloud (external provider)
- Private cloud (internal deployment)
- Hybrid cloud
  - Public + Private



Rackspace example

The Cloud



- This can be an application server
- Or your home machine
- Or belong to one of your end users
- Or a cloud VM
- Or a smartphone

The Cloud

- Advantages
  - Metered pricing (pay as you go)
  - Project scalability (unlimited)
  - Safer (offsite/redundant)
  - Economies of scale
    - Expertise
    - Support

The Cloud

- Disadvantages
  - Less hardware control
    - Provider-controlled downtime
    - Virtualization (efficiency)
  - Provider lock-in
    - Provider-specific apis/sdks/features
    - Expensive to switch clouds or deploy locally
    - jclouds minimizes this disadvantage

The Cloud

- Can’t someone else do it?

The Cloud

- Database specific advantages
  - Optimized by provider
    - Settings
    - Container virtualization
  - Automated software updates
  - Redundant data storage
  - Backup
  - Migration
  - Support

OpenStack

- Cloud OS
- Open-sourced by Rackspace and NASA (2010)
- Free
- Supported
  - AT&T, HP, IBM, Red Hat, Rackspace, Dell, Cisco, Intel, VMware, …

jclouds

- Cloud SDK
- Apache project
- Java (and Clo*j*ure)
- Easy
- Portable
- Cloud-agnostic
- Community
- Open source

jclouds

- HTTP requests, responses, retries
- Authentication and re-authentication
- Pagination
- Polling
- Rate limits
- Retries
- Abstractions
- Logging
- Less code

jclouds


cloudera
enSTRATUS
NETFLIX OSS
YOU?
FUJITSU
Alcatel·Lucent
abiquo
information everywhere
WSO2
GIGASPACES
OVH.COM
redhat
EnterpriseDB
The Enterprise PostgreSQL Company
IBM
pallet
Adobe
cloudsoft
NEOTYS
hp
CloudBees

jclouds

- Services
  - Storage
  - Compute
  - VM Images
  - Load Balancers
  - DNS
  - Databases
  - …
- Providers
  - Openstack
    - Rackspace
    - HP
  - Amazon
  - Azure
  - …

jclouds

Compute Providers

AWS	aws-ec2	US-VA,US-CA,IE,SG
Bluelock	bluelock-vcloud-zone01	US-IN
CloudSigma US	cloudsigma-lvs	US-NV
CloudSigma CH	cloudsigma-zrh	CH-ZH
CloudSigma DC	cloudsigma-wdc	US-DC
DigitalOcean	digitalocean	
ElasticHosts GB	elastichosts-lon-b	GB-LND
ElasticHosts GB	elastichosts-lon-p	GB-LND
ElasticHosts US	elastichosts-sat-p	US-TX
Go2Cloud	go2cloud-jhb1	ZA-GP
GoGrid	gogrid	US-CA,US-VA
Green House Data	greenhousedata-element-vcloud	US-WY
HP	hpcloud-compute	US-NV
Ninefold	ninefold-compute	AU-NSW
OpenHosting	openhosting-east1	US-VA
Rackspace UK (First Gen)	cloudservers-uk	GB-SLG
Rackspace US (First Gen)	cloudservers-us	US-IL,US-TX
Rackspace UK (Next Gen)	rackspace-cloudservers-uk	GB-SLG
Rackspace US (Next Gen)	rackspace-cloudservers-us	US-IL,US-TX
SeverLove	serverlove-z1-man	GB-MAN
SkaliCloud	skalicloud-sdg-my	MY-10
SoftLayer	softlayer	

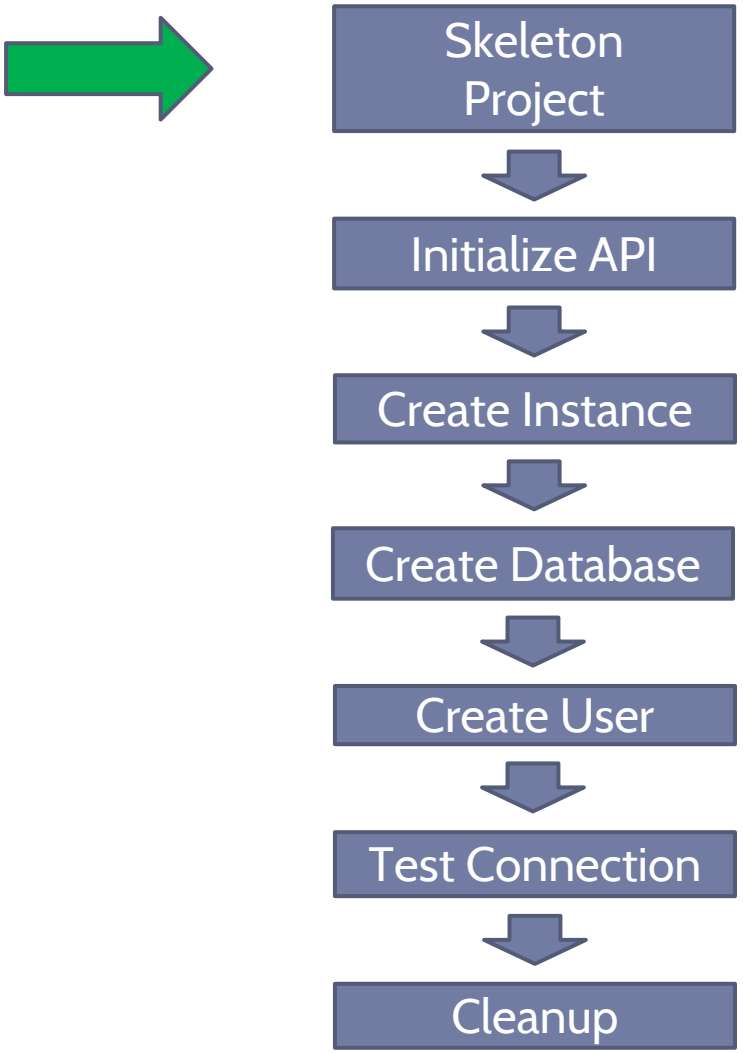
jclouds

- Showcase database code
- Best practices
- Compare with compute code
- Gotchas and workarounds
- Abstractions

Requirements

- Maven 3
- Java 6+
- jclouds
- Windows or Linux [etc..] (thanks Java!)

Java Project



Java Project

- Maven Dependencies
  - Selective subset
  - Versioning
  - jclouds-labs

POM

https://github.com/jclouds/jclouds-examples/blob/master/rackspace/pom.xml

```
<dependency>
        <groupId>org.apache.jclouds.provider</groupId>
        <artifactId>rackspace-clouddatabases-us</artifactId>
        <version>${jclouds.version}</version>
</dependency>
<dependency>
        <groupId>mysql</groupId>
        <artifactId>mysql-connector-java</artifactId>
        <version>5.1.25</version>
</dependency>
```

Logging

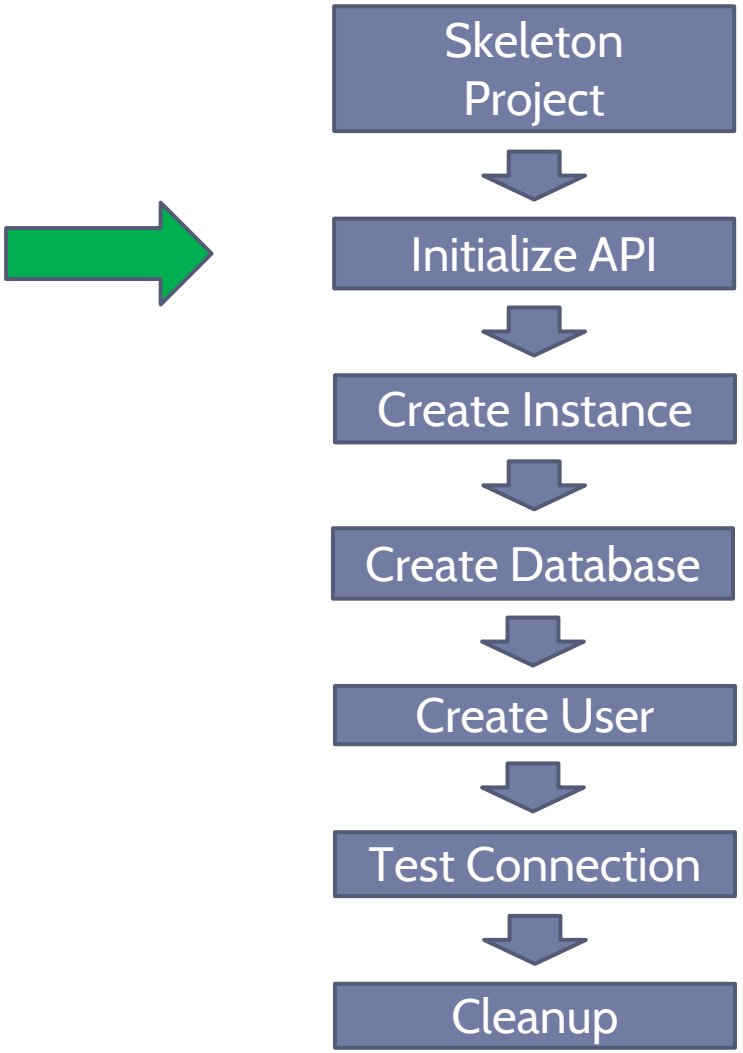
```
// This module is responsible for enabling logging
Iterable<Module> modules = ImmutableSet.<Module> of(new SLF4JLoggingModule());

ComputeServiceContext context = ContextBuilder.newBuilder(provider)
      .credentials(username, apiKey)
      .modules(modules) // don't forget to add the modules to your context!
      .buildView(ComputeServiceContext.class);
```

---

logback.xml

```
<configuration scan="false">
    ...
    <appender name="WIREFILE" class="ch.qos.logback.core.FileAppender">
        <file>target/test-data/jclouds-wire.log</file>

        <encoder>
            <Pattern>%d %-5p [%c] [%thread] %m%n</Pattern>
        </encoder>
    </appender>
```

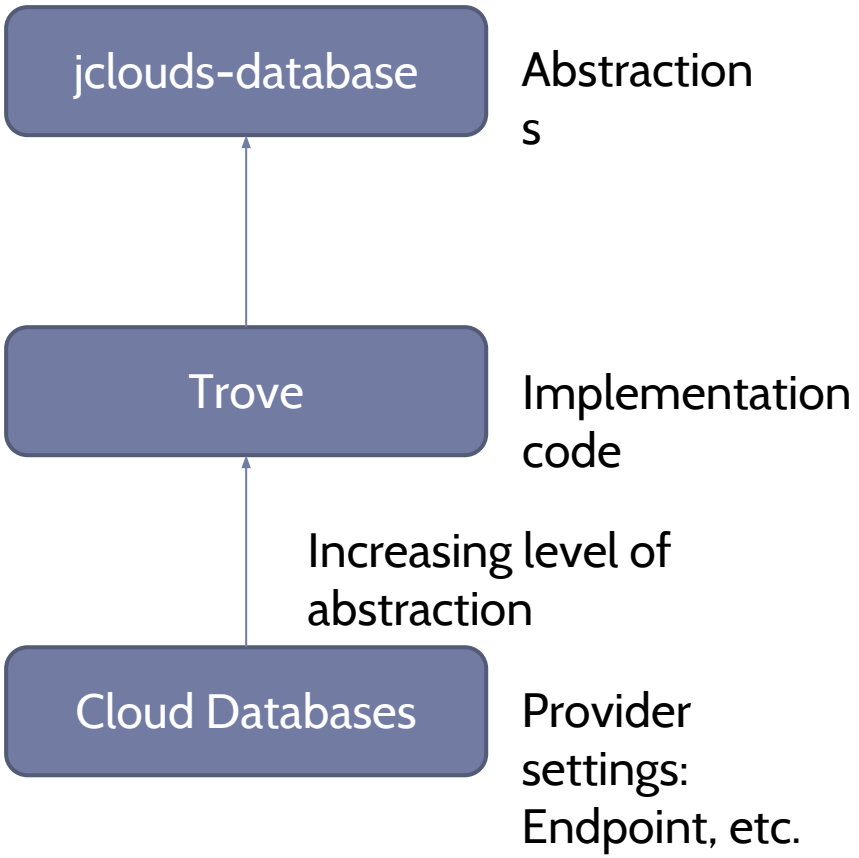
Java Project



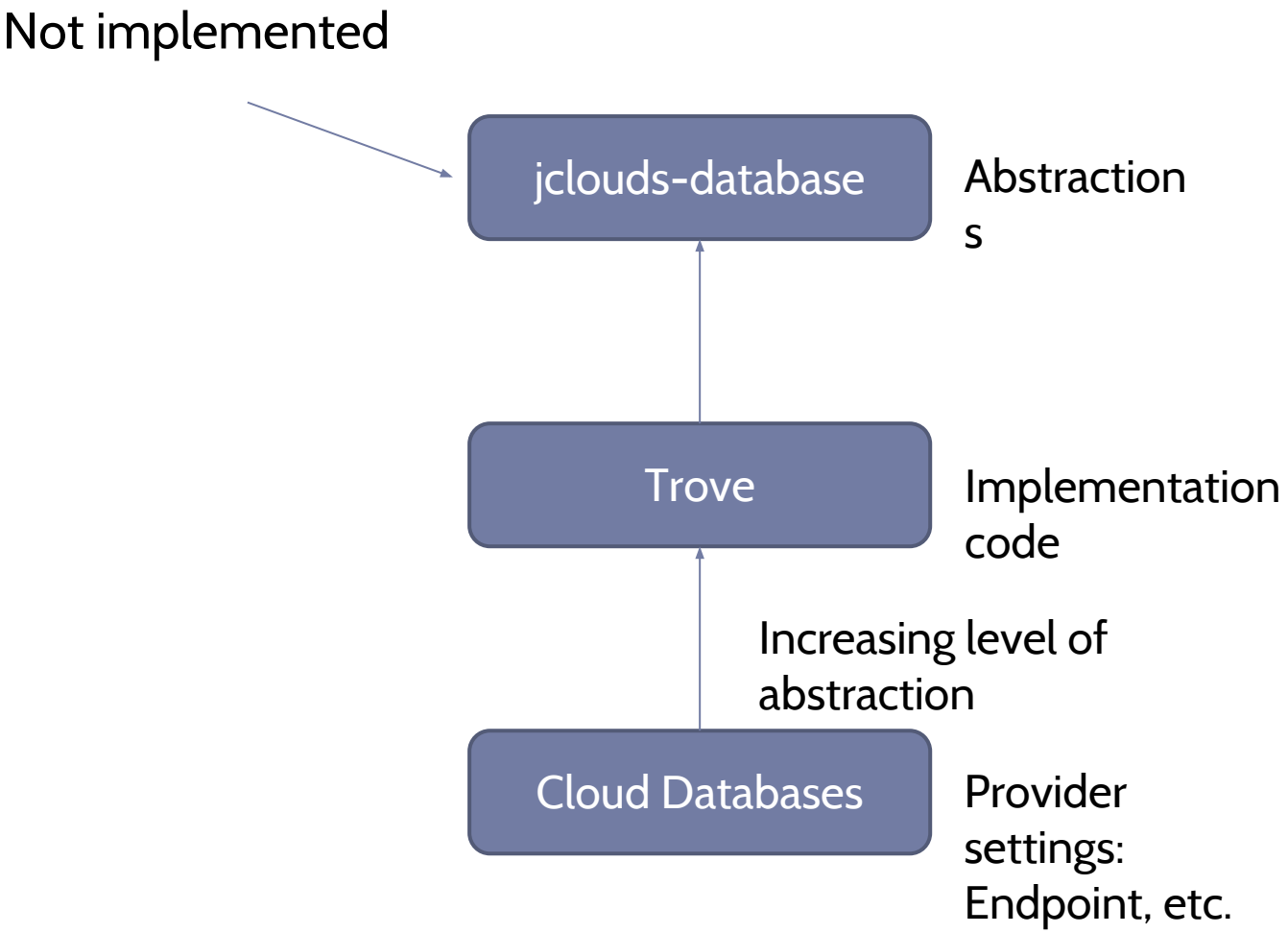
Initialize

```
private final TroveApi troveApi;
troveApi = ContextBuilder
           .newBuilder("rackspace-clouddatabases-us")
           .credentials(username, apiKey)
           .buildApi(TroveApi.class);
```

Architecture



Architecture



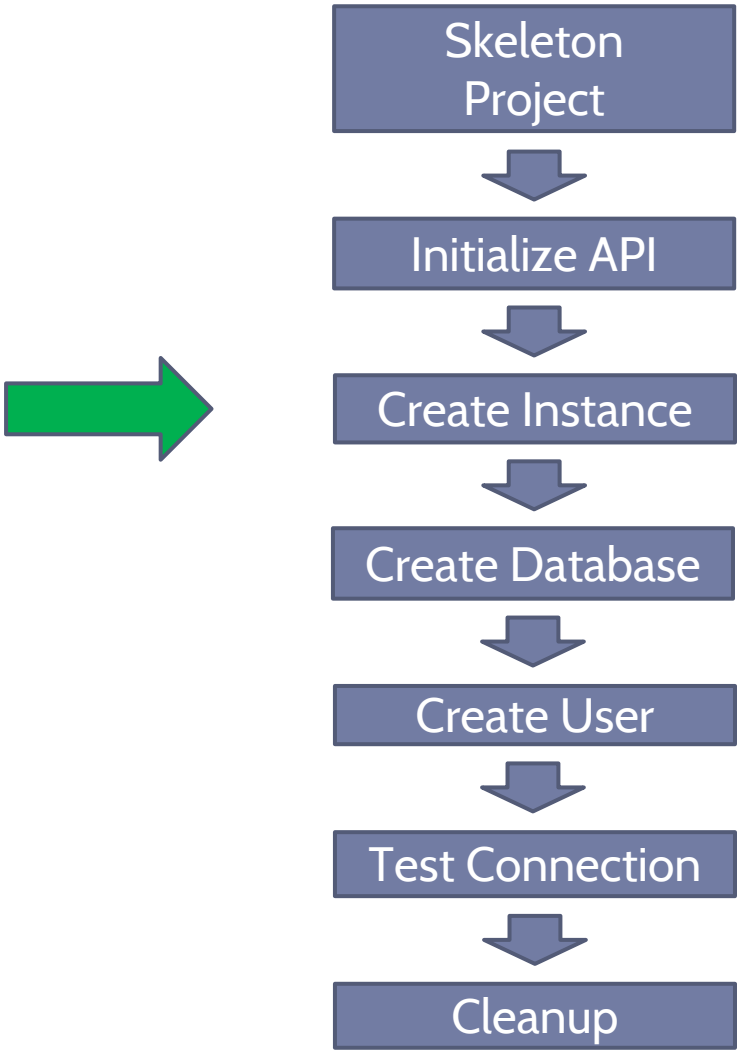
Initialize

```
private final FlavorApi flavorApi;

flavorApi = troveApi.getFlavorApiForZone(ZONE);
```

APIs

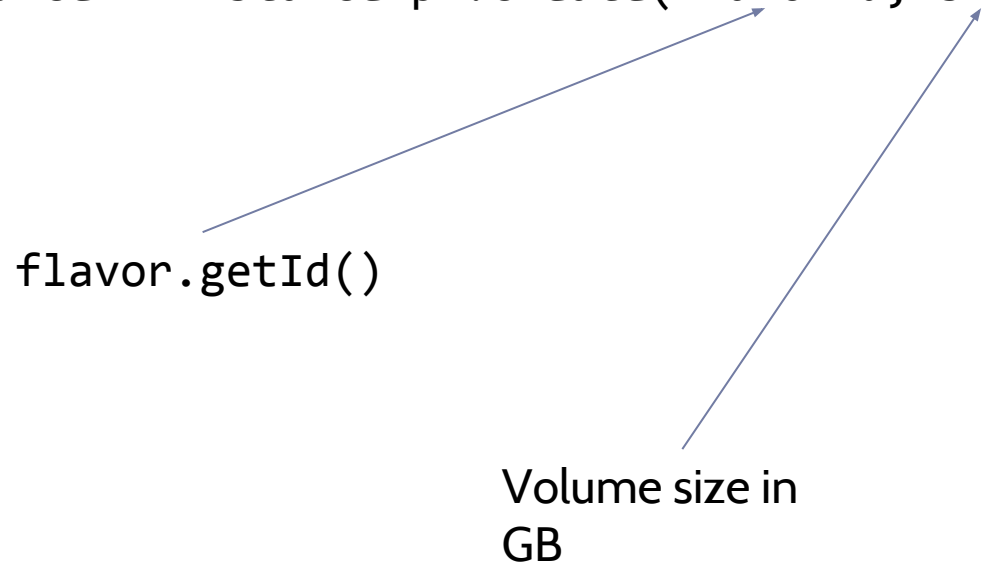
- TroveApi
  - FlavorApi
  - InstanceApi
  - DatabaseApi
  - UserApi
- Utils

Java Project



Create Instance

```
Flavor flavor = Iterables.getFirst(flavorApi.list(), null);

…

Instance instance = instanceApi.create(flavorId, size, name);
```



Create Instance

```
Instance updatedInstance = awaitAvailable(instance, instanceApi);
```

Create Instance

```
Instance updatedInstance = awaitAvailable(instance, instanceApi);
```

Polls status, waits until ready. Will not retry by itself!

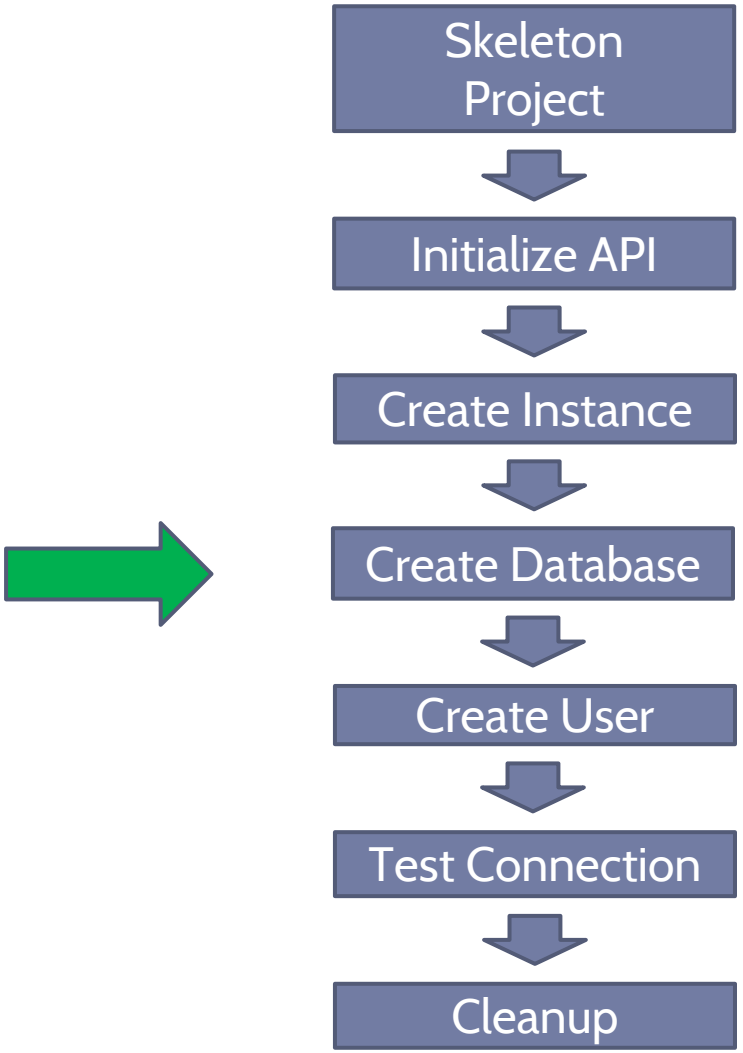
Actual Code

```
InstanceApi instanceApi = api.getInstanceApiForZone(zone);
for (int retries = 0; retries < 10; retries++) {
         Instance instance = null;
         try {
            instance = instanceApi.create(flavorId, size, name);
         } catch (Exception e) {
            Uninterruptibles.sleepUninterruptibly(15, TimeUnit.SECONDS);
            logger.error(Arrays.toString(e.getStackTrace()));
            continue;
         }
         Instance updatedInstance = awaitAvailable(instance, instanceApi);
         if (updatedInstance != null) {
            return updatedInstance;
         }
         instanceApi.delete(instance.getId());
         InstancePredicates.awaitDeleted(instanceApi).apply(instance);
}
return null;
```

Actual Code

```
Utils.
getWorkingInstance(
   String zone,
   String name,
   String flavorId,
   int size)
```

Java Project



Create Database

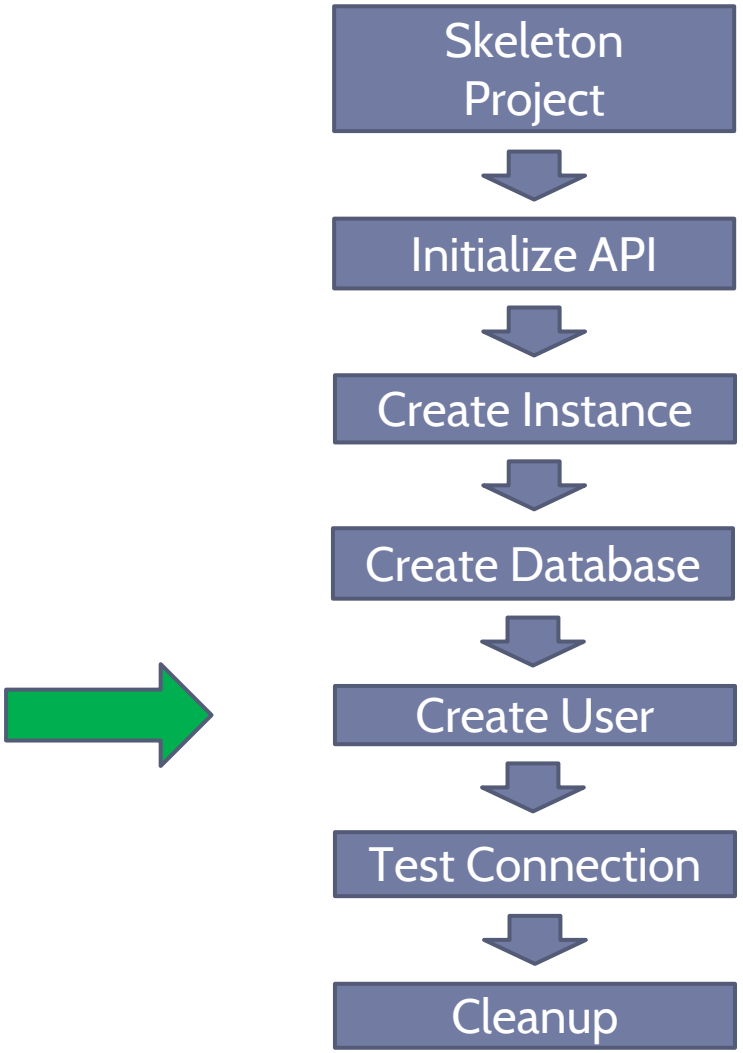
```
troveApi = ContextBuilder.newBuilder(PROVIDER)
             .credentials(username, apiKey)
             .buildApi(TroveApi.class);

instanceApi = troveApi.getInstanceApiForZone(ZONE);

databaseApi = troveApi
.getDatabaseApiForZoneAndInstance(ZONE,getInstance().getId());
```

getSomeApiForXandYandZ – fairly common in jclouds

Create Database

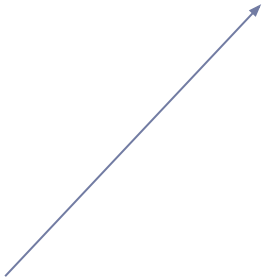
```
boolean result = databaseApi.create(NAME);
```

Java Project



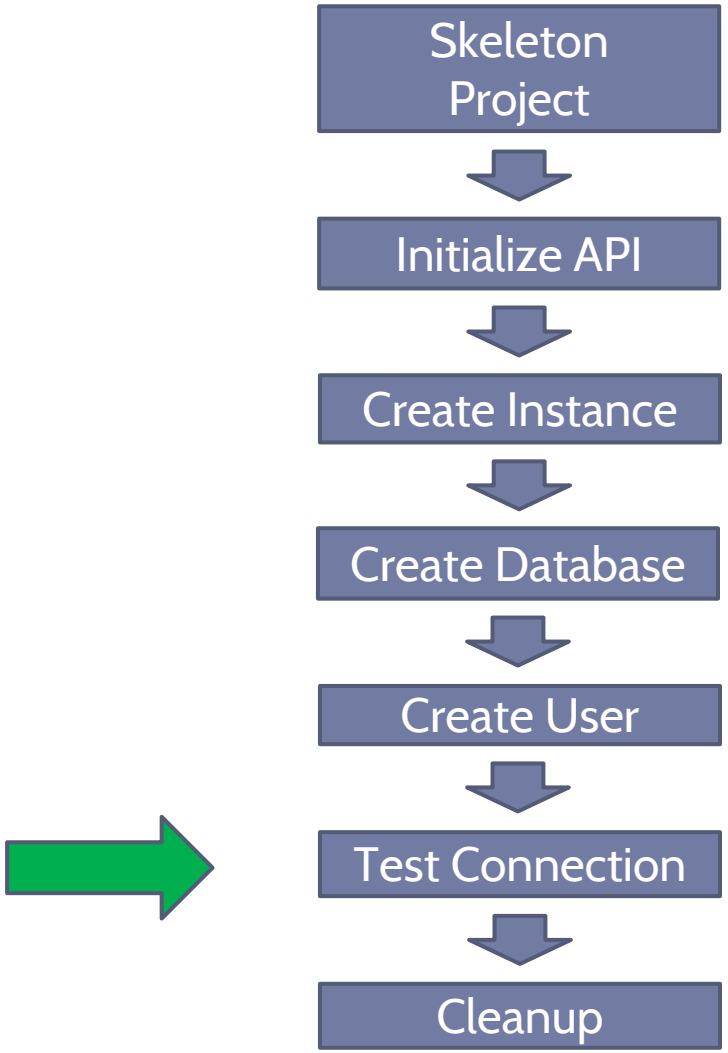
Create User

```
userApi = troveApi
.getUserApiForZoneAndInstance(ZONE, instance.getId());

boolean result = userApi.create(UNAME, PASSWORD, DBNAME);
```



User name
User password
Database
name

Java Project



Test Connection

Load balancer needed!

```
CreateLoadBalancer createLB = CreateLoadBalancer.builder()
                .name(NAME)
                .protocol("MYSQL")
                .port(3306)
                .algorithm(LoadBalancer.Algorithm.RANDOM)
                .nodes(addNodes)
                .virtualIPType(VirtualIP.Type.PUBLIC)
                .build();
```

Test Connection

```
loadBalancer = lbApi.create(createLB);
```

Test Connection

```
StringBuilder connString = new StringBuilder();
connString.append("jdbc:mysql://");
connString
.append(getVirtualIPv4(getLb().getVirtualIPs()));
connString.append("/");
connString.append(DBNAME); connString.append("?
user=");
connString.append(UNAME);
connString.append("&password=");
connString.append(PASSWORD);
```

Test Connection

```
Connection conn =
DriverManager.getConnection(connString.toString());
```

Test Connection

```
Statement stmt = conn.createStatement();
ResultSet rs = stmt.executeQuery("SELECT 3+5");
rs.first();

System.out.format("  3+5 is %s%n", rs.getInt(1));
```

Going forward

- jclouds examples
  - https://github.com/jclouds/jclouds-examples
- More docs
  - http://jclouds.incubator.apache.org/documentation/
  - http://javadocs.jclouds.cloudbees.net/
- Maven alternatives?
  - http://jclouds.incubator.apache.org/documentation/userguide/installation-guide/
- Contribute!
  - https://wiki.apache.org/jclouds/How%20to%20Contribute

Java Project

- Compile
  - javac -classpath "lib/*:src/main/java/:src/main/resources/" src/main/java/org/jclouds/examples/rackspace/*.java
- Run
  - java -classpath "lib/*:src/main/java/:src/main/resources/" org.jclouds.examples.rackspace.clouddatabases.CreateInstance username apikey

Going forward

- TroveApi
  - Backup Extension
  - Settings Extension
- Abstraction layer

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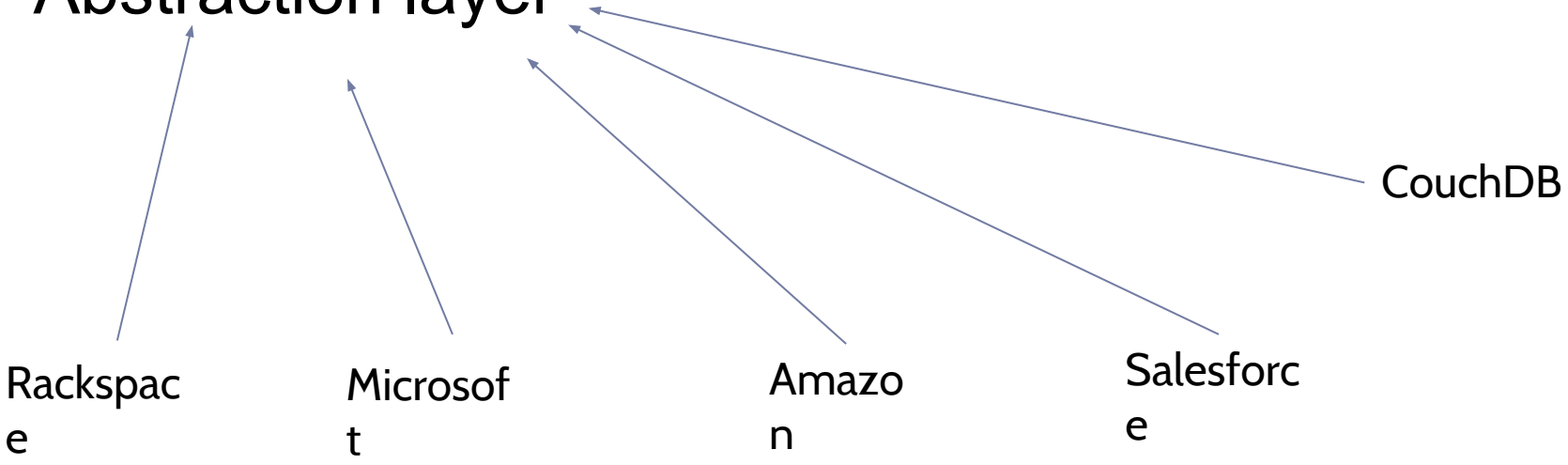

Going forward

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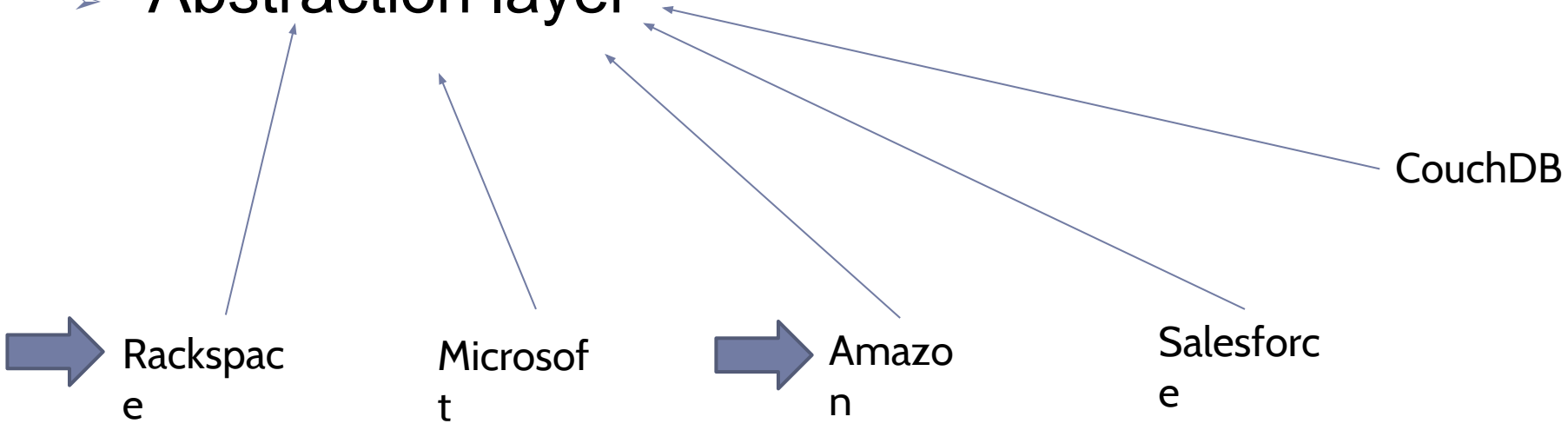

Going forward

Going forward

Collaborate!

http://jclouds.apache.org/

http://jclouds.apache.org/community/

Thank you!

http://developer.rackspace.com

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