OpenStack Compute Service
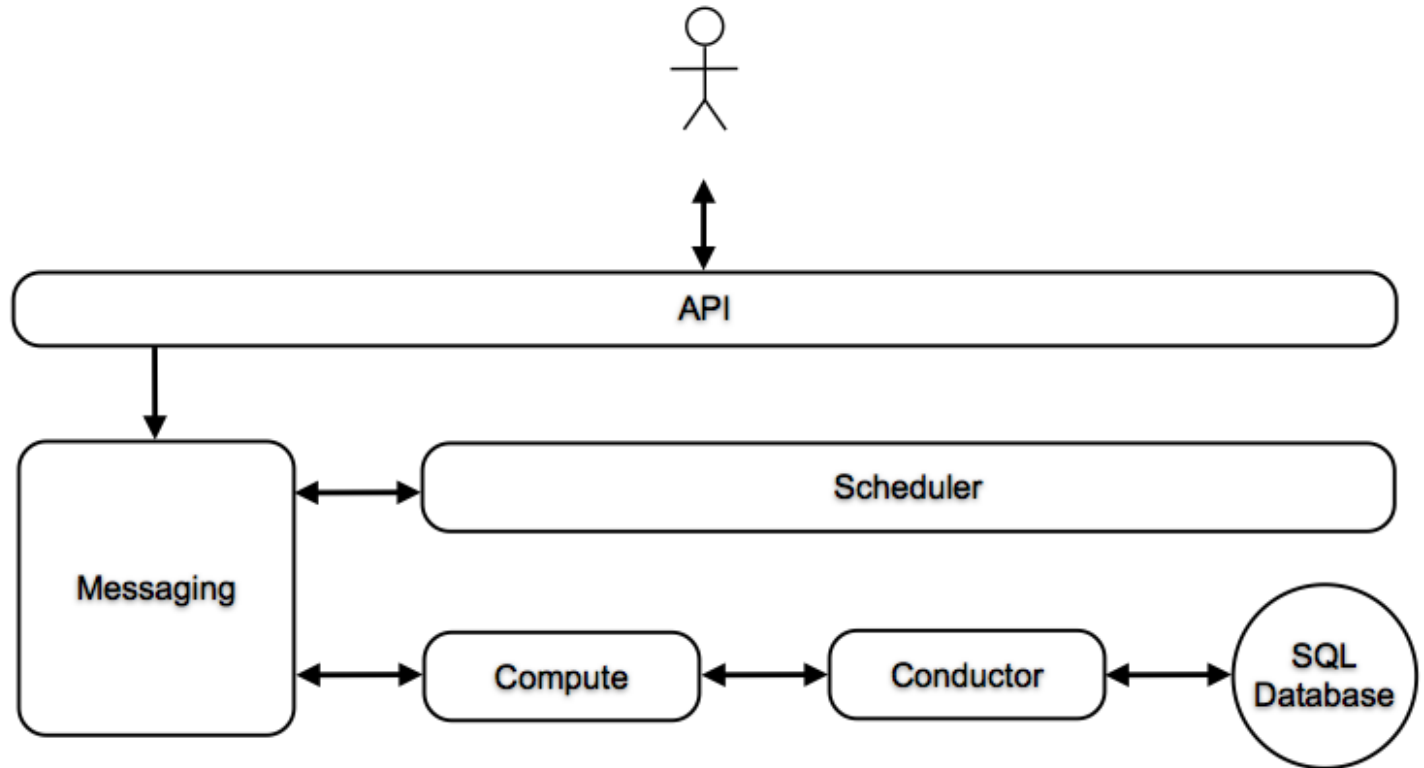
Codename: Nova
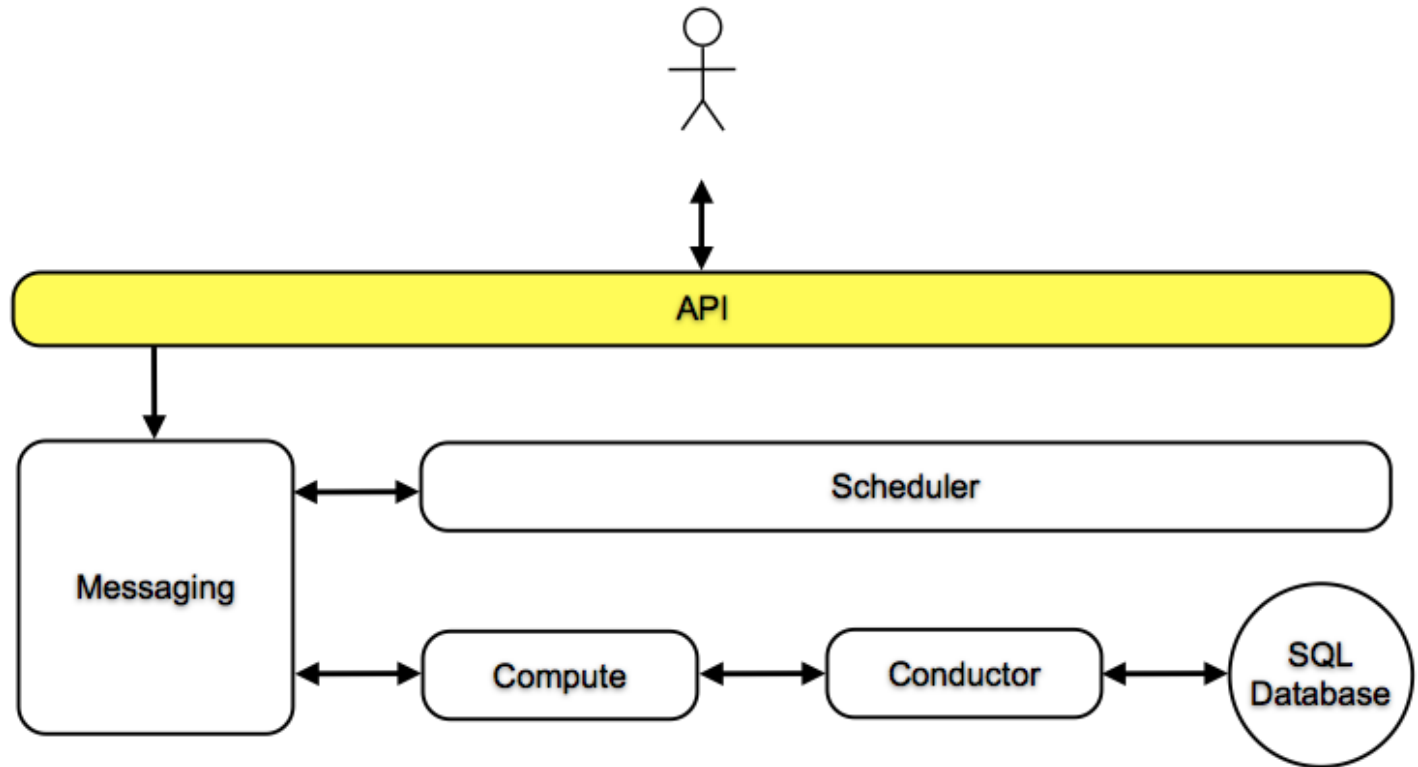
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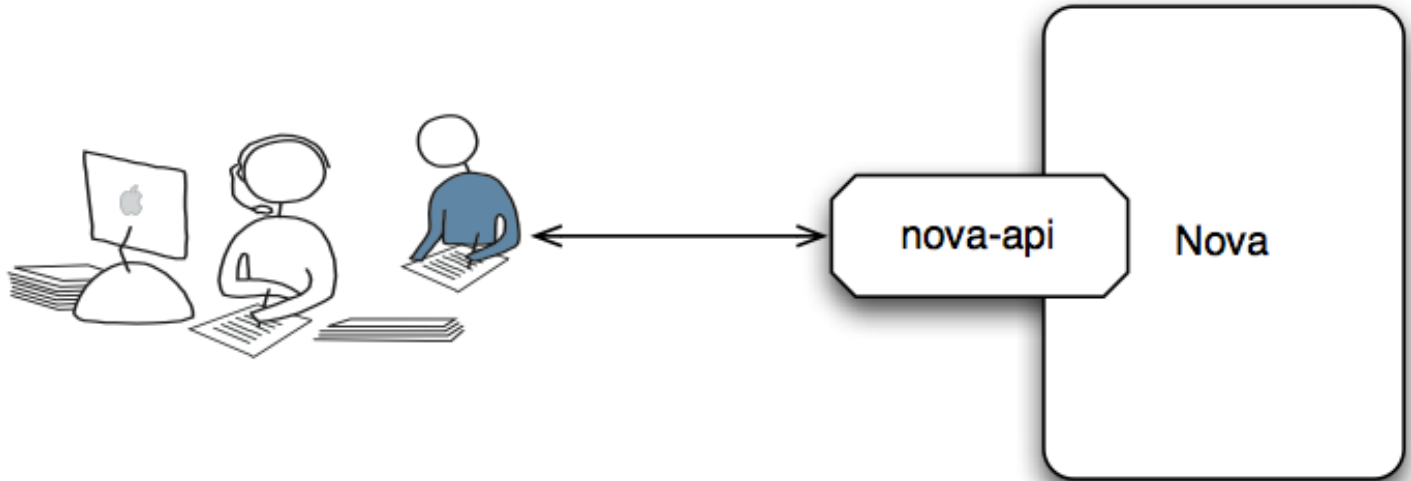# Nova Overview
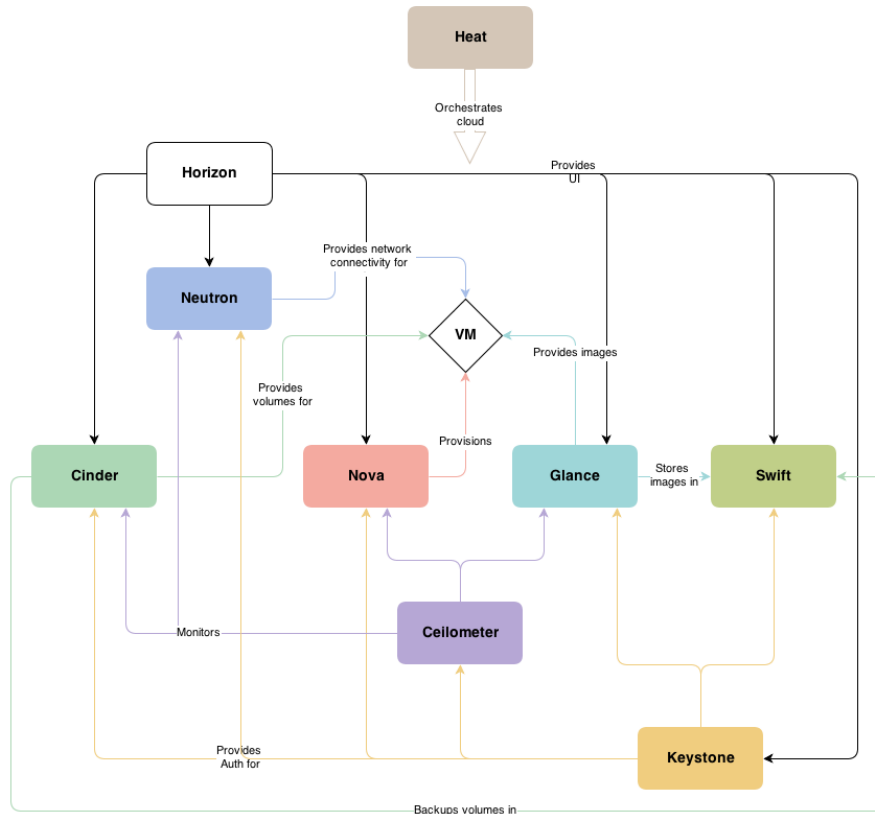
Nova Components

Nova API Node
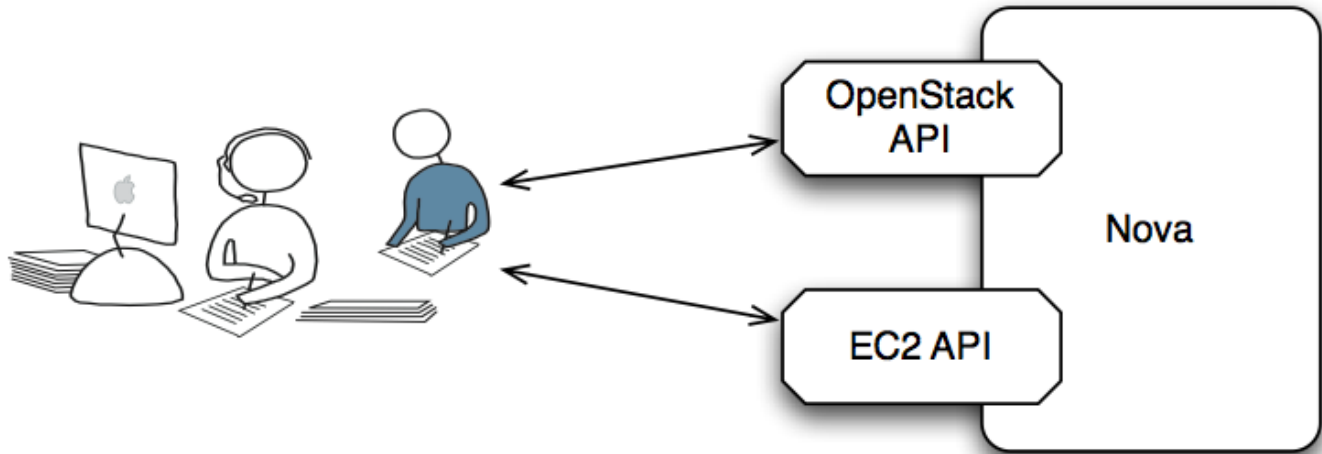
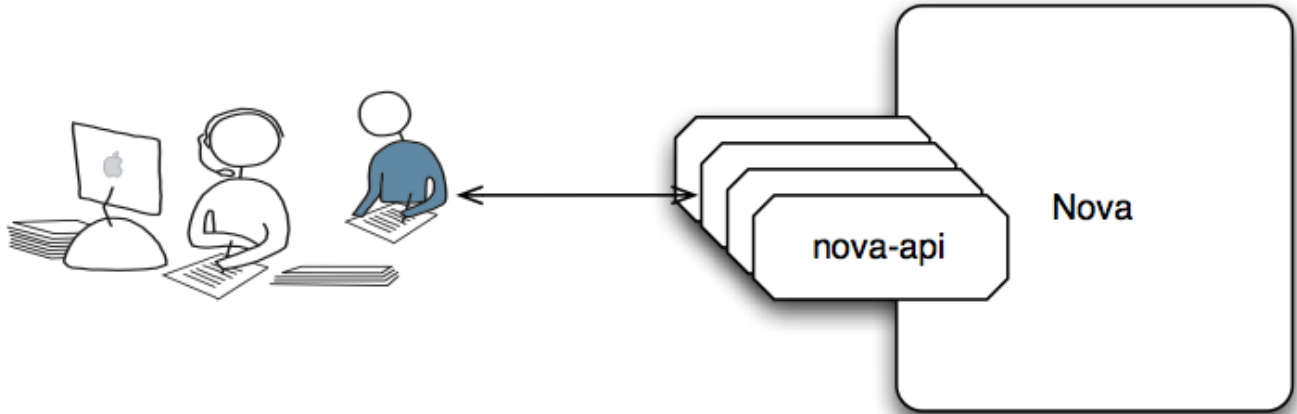rackspace.
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API Node

- An API Node is a machine running the nova-api service
- Serves as the primary gateway to Nova

API Node

- Supports the OpenStack API and the EC2 API
- EC2 API is support for backwards compatibility
- The OpenStack API is preferred when possible

API Node

- A Nova installation has one or more API Nodes

API Flow

3 Pass Auth Token to Endpoint from Service Catalog along with Request Parameters

Endpoint

Compute API

1 Username Password

2 Auth Token Service Catalog

Identity Service API

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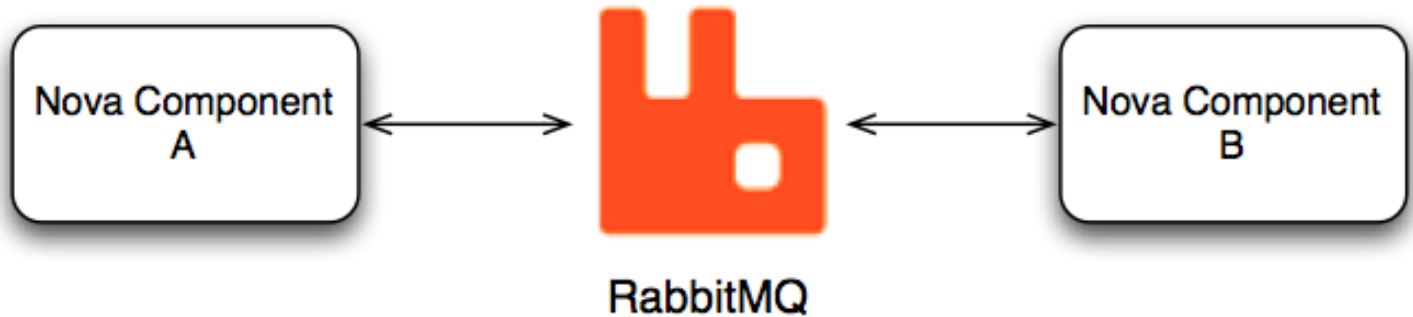the **open cloud** company
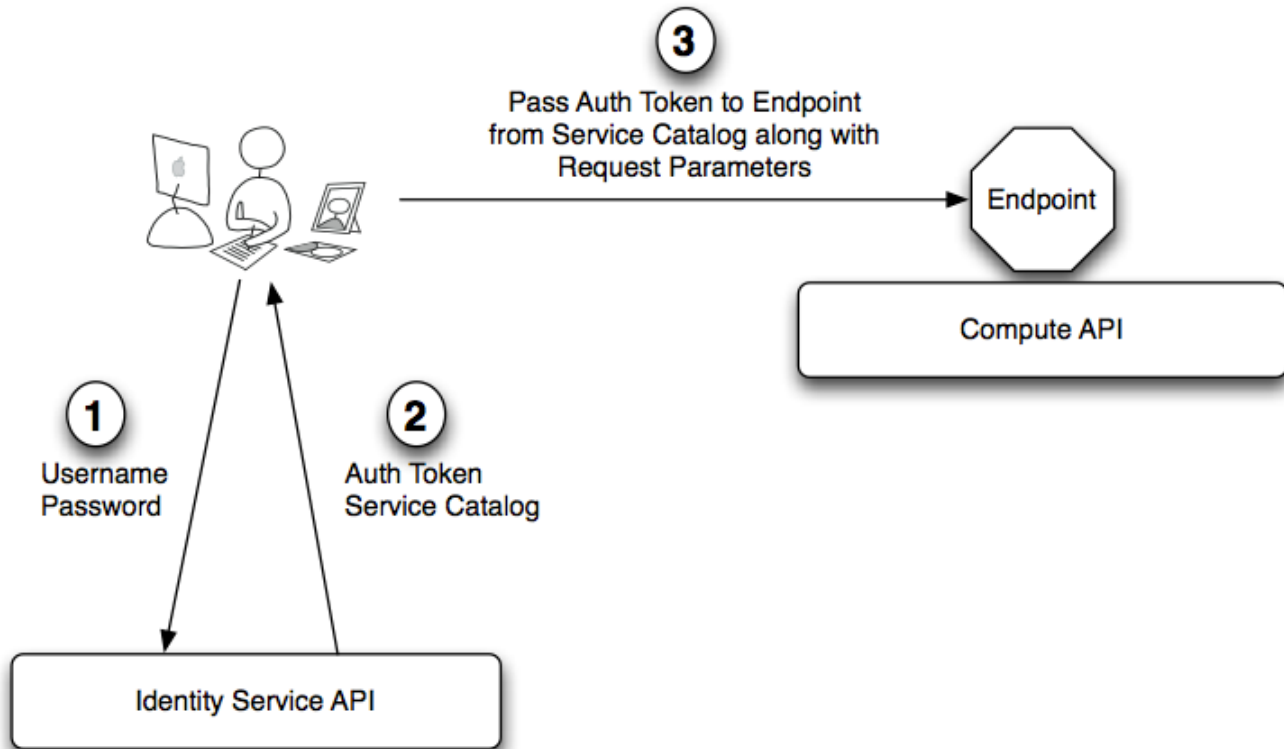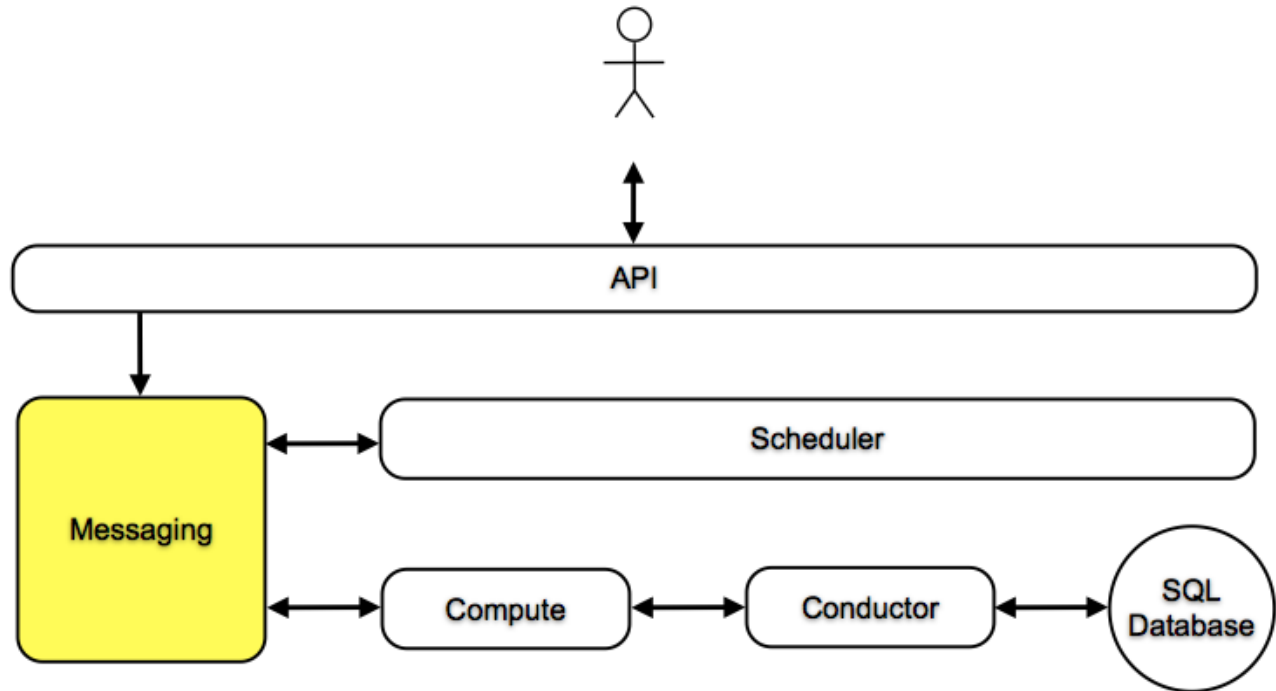
Nova Messaging

Messaging

- OpenStack uses an AMQP message broker between components

    - Ubuntu deployments of OpenStack use RabbitMQ by default
    - Red Hat deployments of OpenStack use Qpid by default

- Allows components to be loosely coupled
- Allows asynchronous design
- Allows balancing of the load between multiple available service instances

Messaging

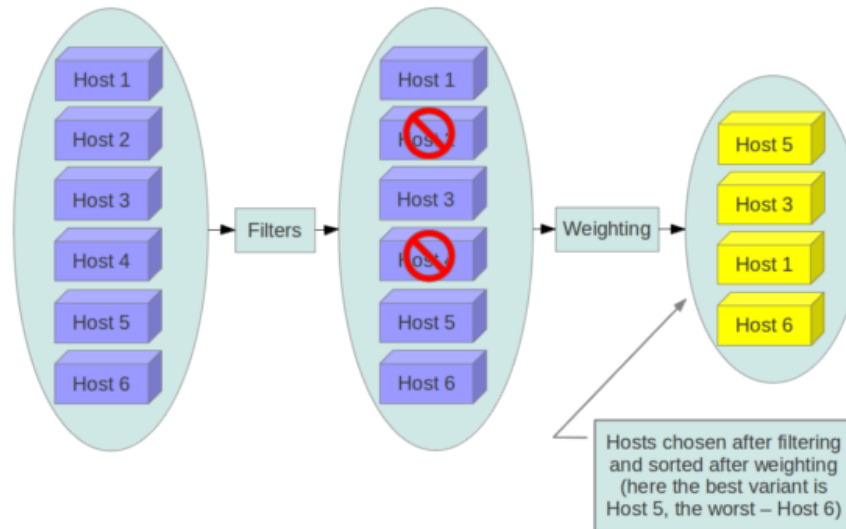Publisher → Message → Message Queue → Message → Consumer
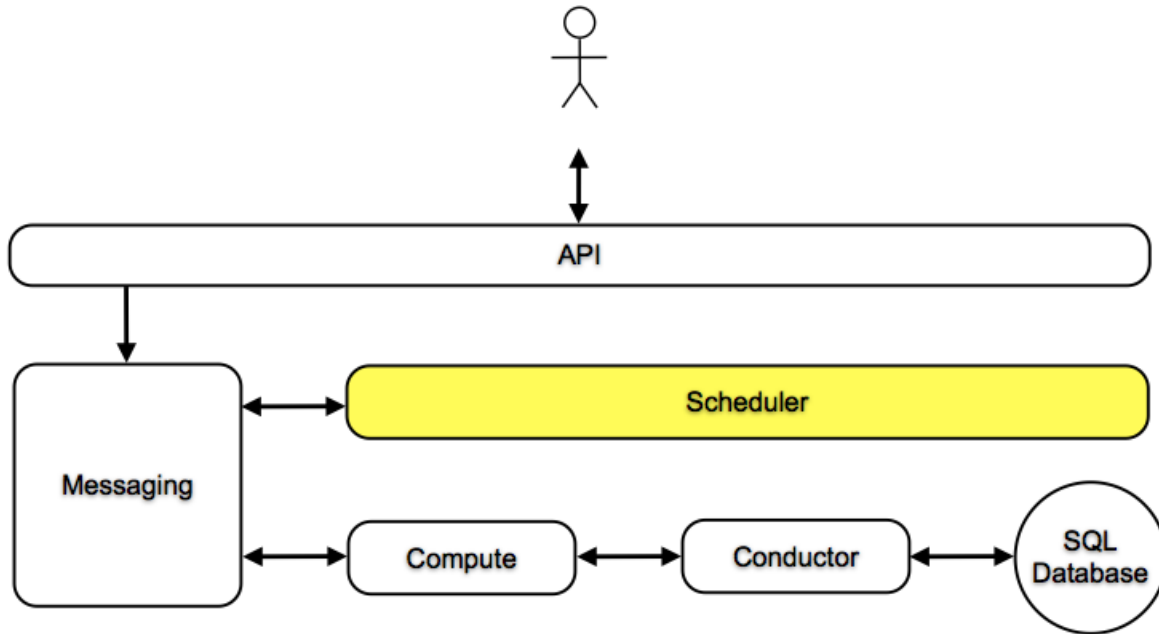
Nova Scheduler

Nova Filter Scheduler

- Supports filtering and weighting to make informed decisions on where a new instance should be created
- Supports only working with Compute Nodes (not Neutron, Cinder, etc.)

Filtering

Available filters include:

- AllHostsFilter
- ImagePropertiesFilter
- AvailabilityZoneFilter
- ComputeCapabilitiesFilter
- AggregateInstanceExtraSpecsFilter
- ComputeFilter
- CoreFilter
- IsolatedHostsFilter

- JsonFilter
- RamFilter
- SimpleCIDRAffinityFilter
- DifferentHostFilter
- SameHostFilter
- RetryFilter
- TrustedFilter

Costs & Weights
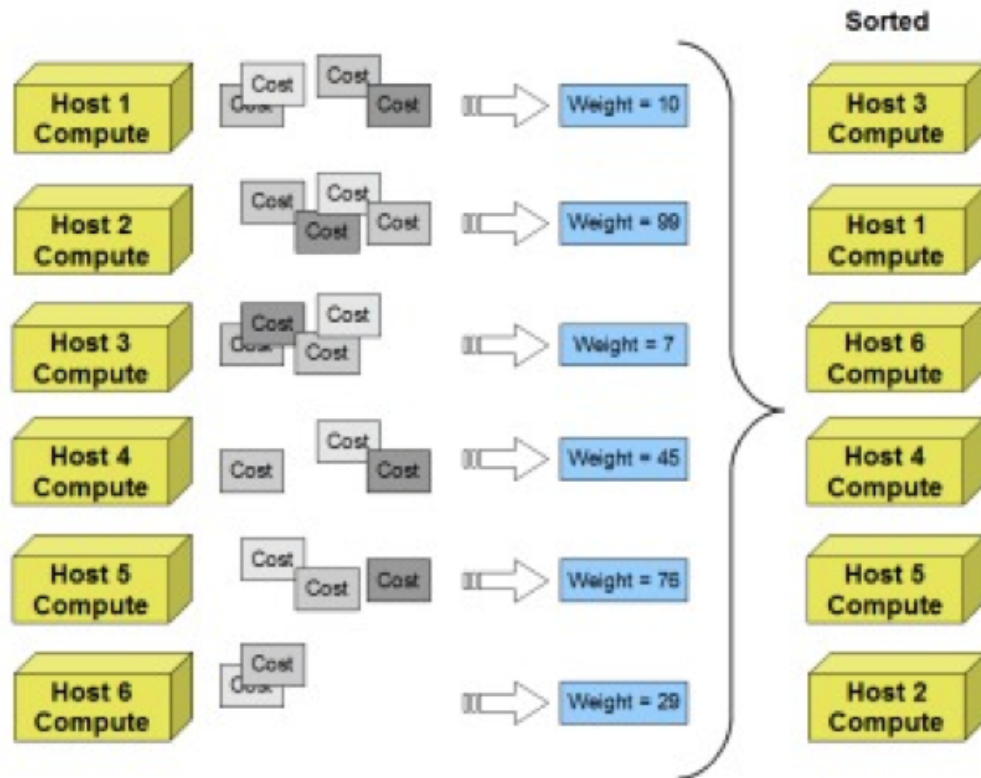
Nova Conductor
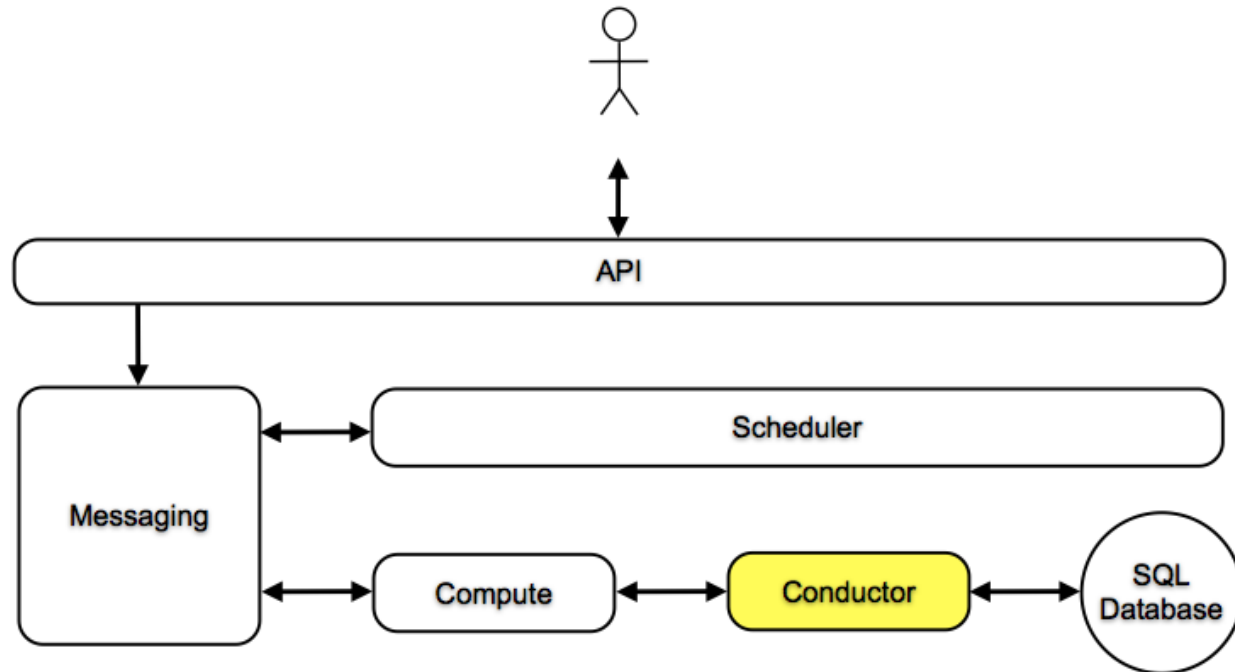
Nova Conductor

- **Aims to enable "No DB" compute**

  - Remove direct DB access from compute service
  - Compute nodes are least trusted component
 - Direct DB access complicates upgrades

- **Layer on top of the compute service**

  - Abstracts all direct DB access away from compute nodes
  - Can be scaled horizontally, similar to nova-api or nova-scheduler
  - Should not be run on compute nodes (eliminates security benefit)
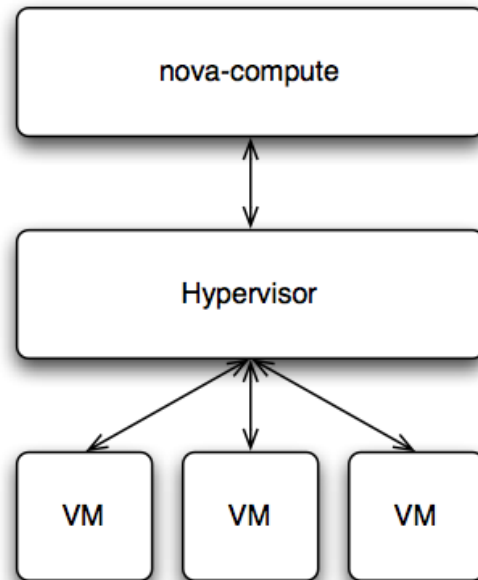
- **Future of the Conductor service**

  - Implement long-running complex operations
  - Ensure forward progress and graceful error handling
  - Very beneficial for operations across multiple compute nodes
  - Make nova-compute much simpler and focused on hypervisor orchestration
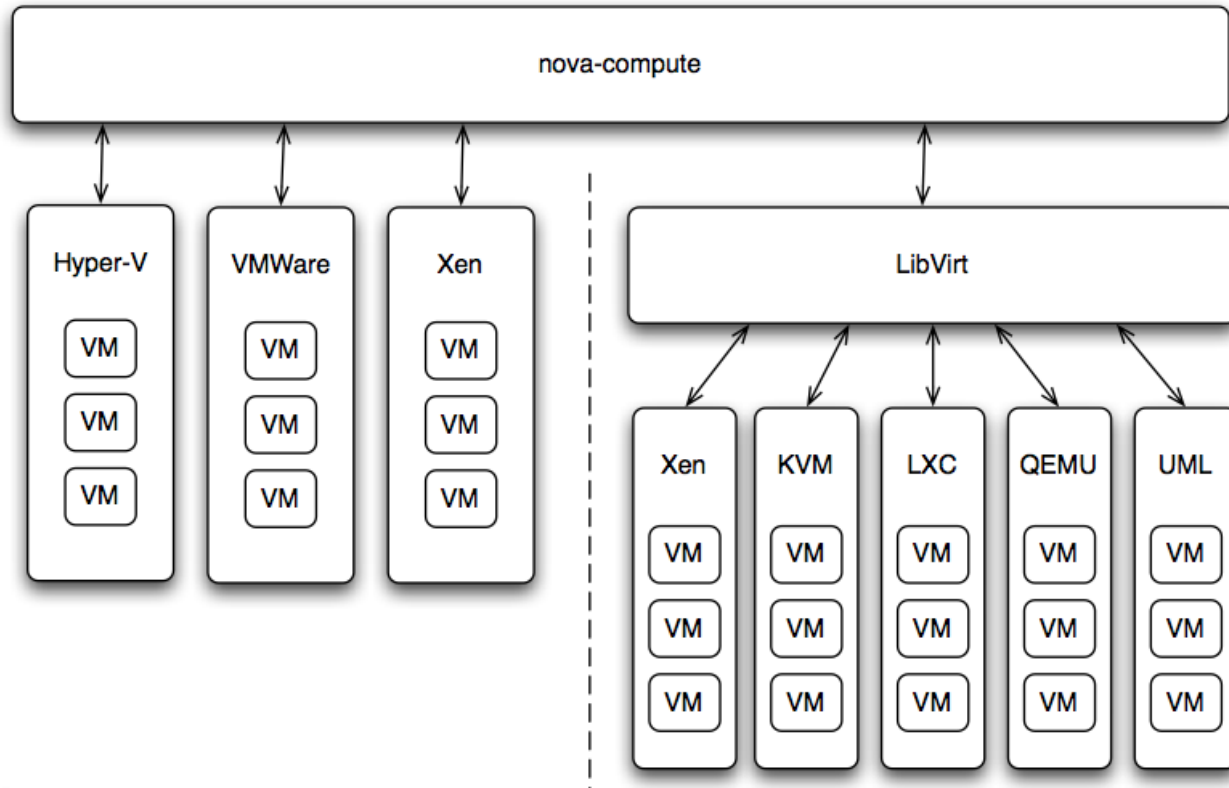
Nova Compute Node
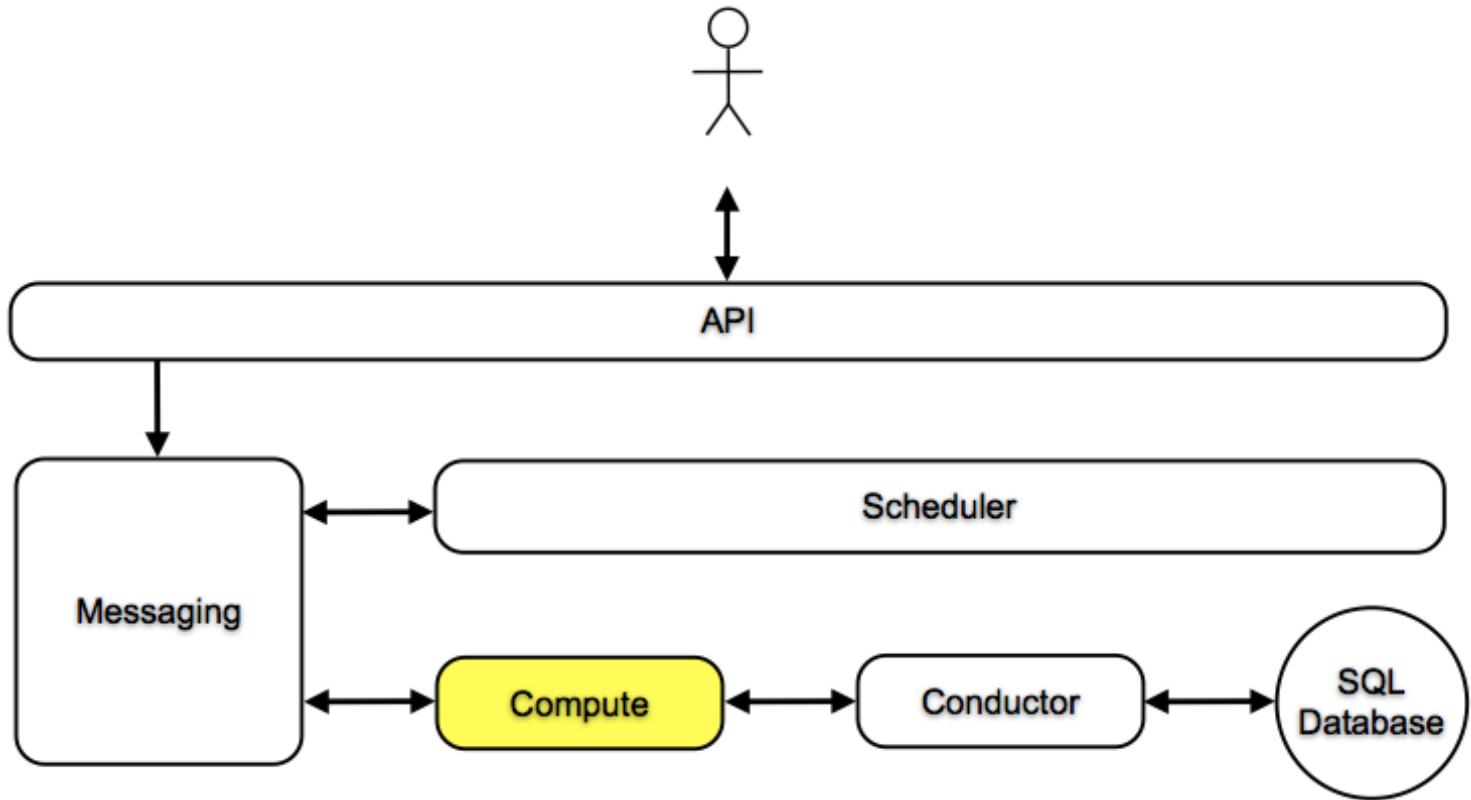
Nova Compute Node

Nova Compute Node

Nova Configuration

- Configuration Files (/etc/nova)

    - api-paste.ini
    - nova.conf
    - nova-compute.conf
    - policy.json

Nova Filesystem

/etc/nova/
— api-paste.ini
— logging.conf
— nova.conf
— nova-compute.conf
— rootwrap.conf
— policy.json

/var/log/nova/
— nova-api.log
— nova-cert.log
— nova-compute.log
— nova-conductor.log
— nova-consoleauth.log
— nova-manage.log
— nova-network.log
— nova-scheduler.log

/var/lib/nova/
— buckets
— CA
— images
— instances
— keys
— networks
— nova.sqlite
— tmp

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Nova Filesystem

```
/var/lib/nova/instances/
├── _base
54eb3535-0904-433f-9d2c-5b0436bad0d2
├──
8387308d-e692-4839-b17d-cabc2c2f81ae
| ├── compute_nodes | └── locks
```

```
/var/lib/nova/instances/_base | ├──
c46a168a-1b23-40e2-a092-edab61c0b91a | ├──
72b8441a-1610-42b9-bf00-d346971f4b6e
├── cc0135e6400496ce6ce0707b08affec80a785c3
└── dc0ff2c25d0403abc64573004bf327434dfa25fb
```

```
/var/lib/nova/instances/54eb3535-0904-433f-9d2c-5b0436bad0d2/
├── console.log
├── disk
├── disk.config
├── disk.info
└── libvirt.xml
```
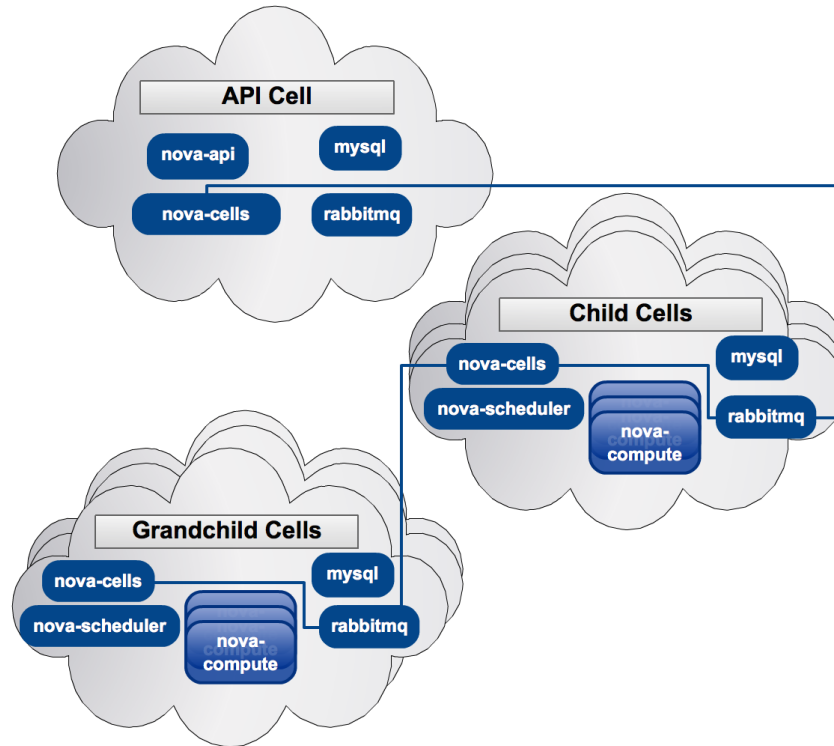
```
/var/lib/nova/instances/8387308d-e692-4839-b17d
├── console.log
├── disk
├── disk.config
├── disk.info
├── kernel
├── libvirt.xml
└── ramdisk
```

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Live-Migration
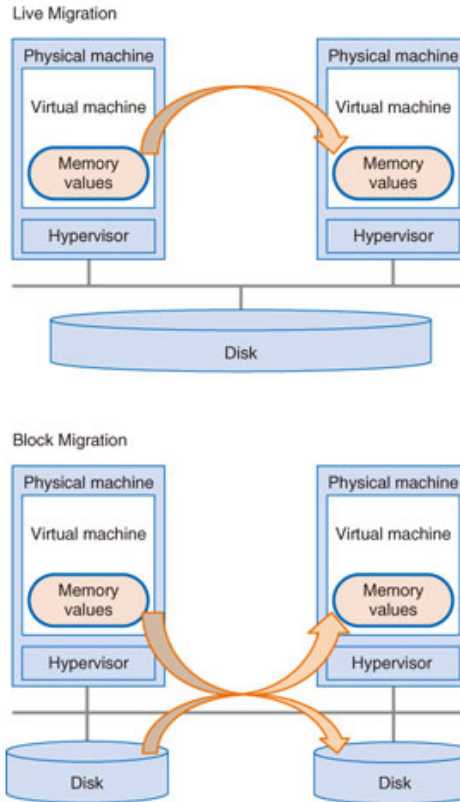
Nova Cells

Nova Troubleshooting

- Inspect the log files

    - cat /var/log/nova/nova-*.log

- Inspect the running processes

    - pgrep -l "keystone|glance|nova|neutron"

- Inspect hypervisor

    - sudo virsh list --all

- Inspect messaging and database

    - rabbitmqctl
    - sqlite3, mysql, psql

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