

# Dynamic Code Patterns: Extending Your Applications with Plugins

Doug Hellmann – @doughellmann – PyCon 2013

# What is a “Plugin”?

- Loaded Dynamically
- Extends Core
- Possibly Unknown Source

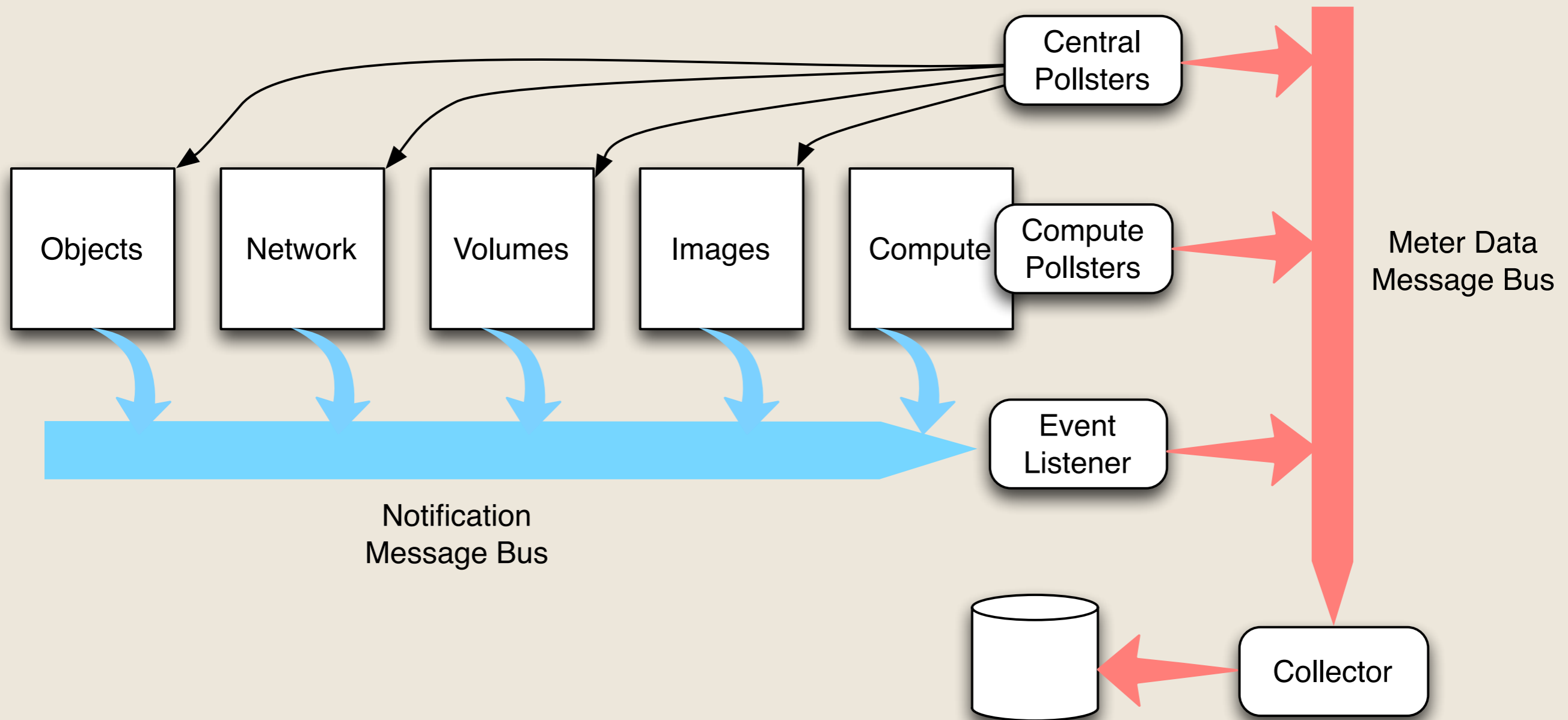
# Why Plugins?

- Better API Abstraction
- Reduce Core Dependencies
- Strategy Pattern
- Visitor Pattern
- Indirect Code Contributions

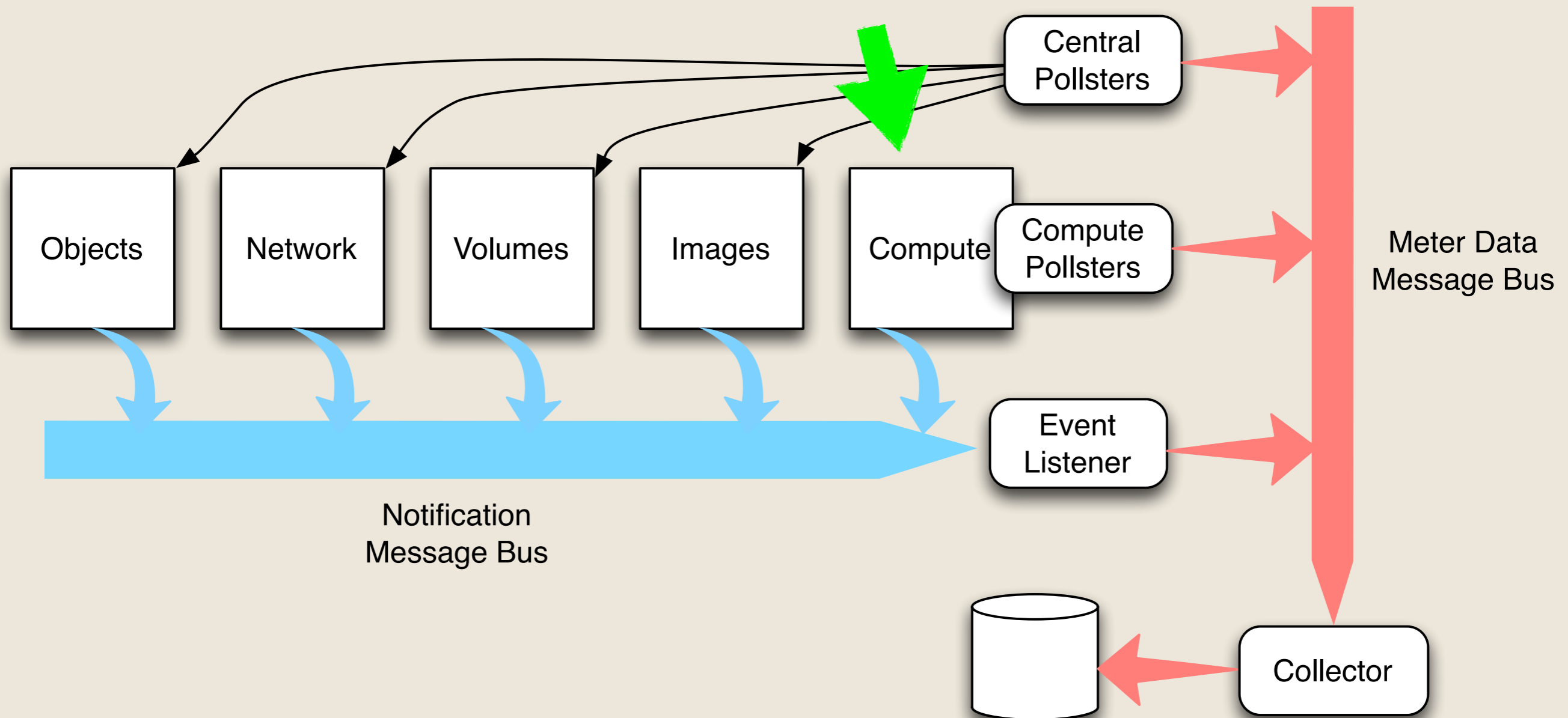
# Ceilometer

- OpenStack Metering
- Measures Clouds
- Varied Billing Requirements
- Deployers Extend and Customize

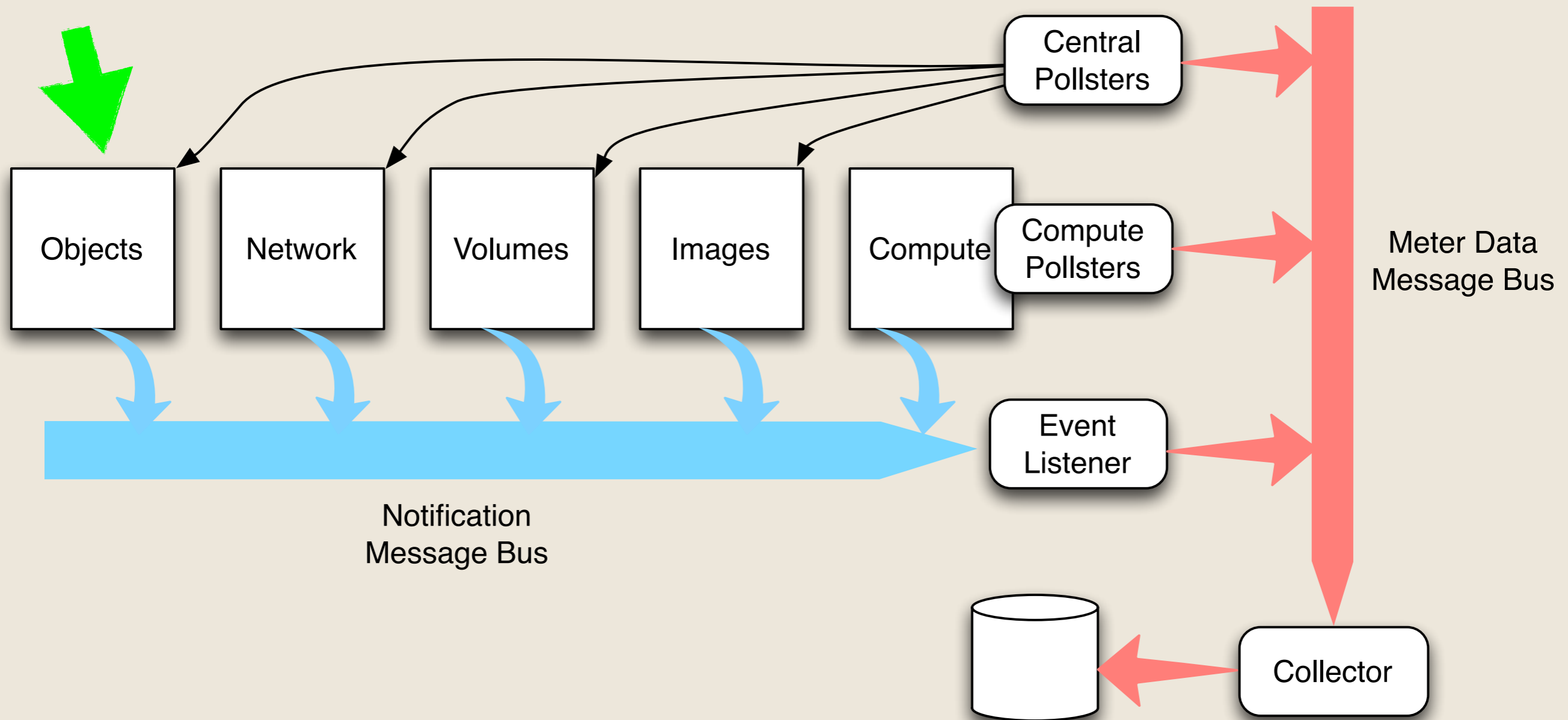
# Ceilometer Design



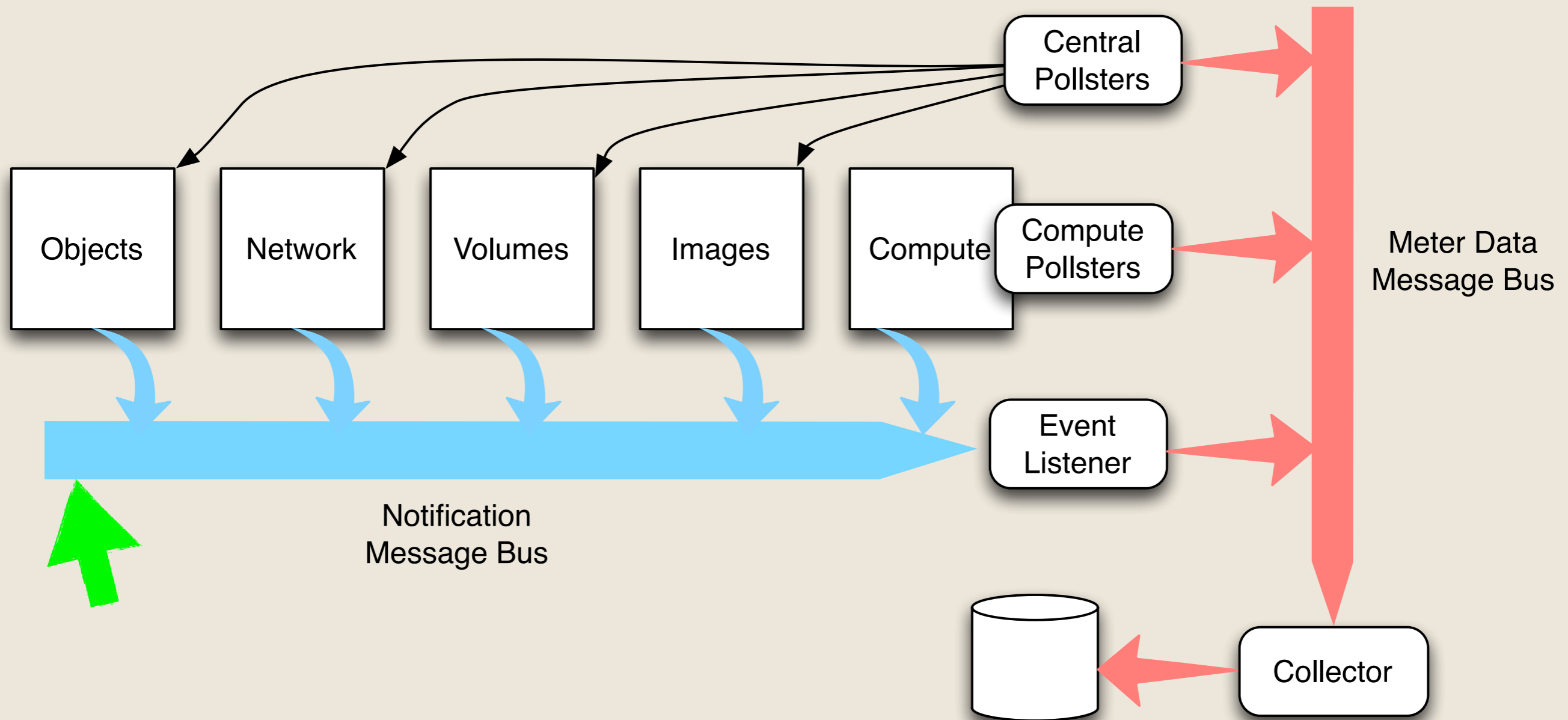
# Ceilometer Design



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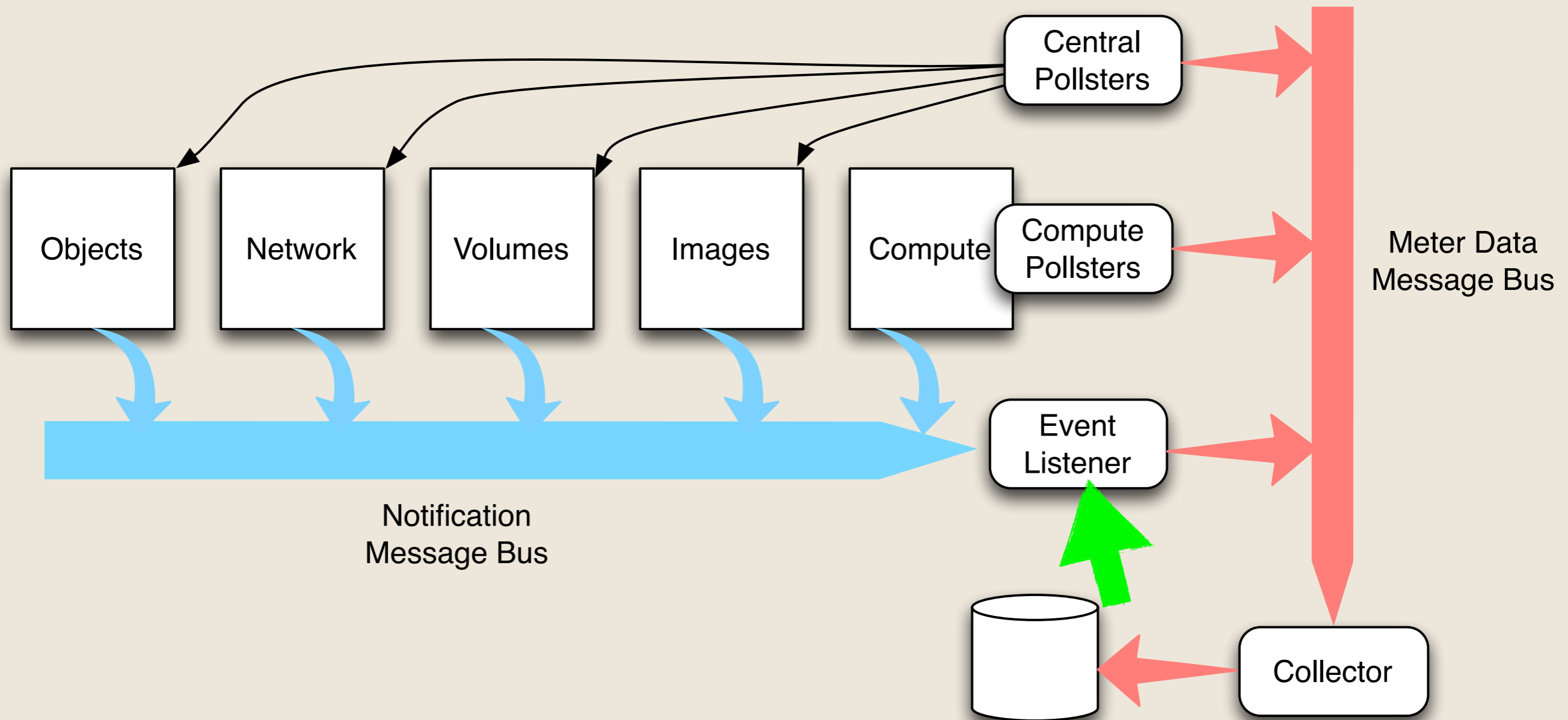


# Ceilometer Design

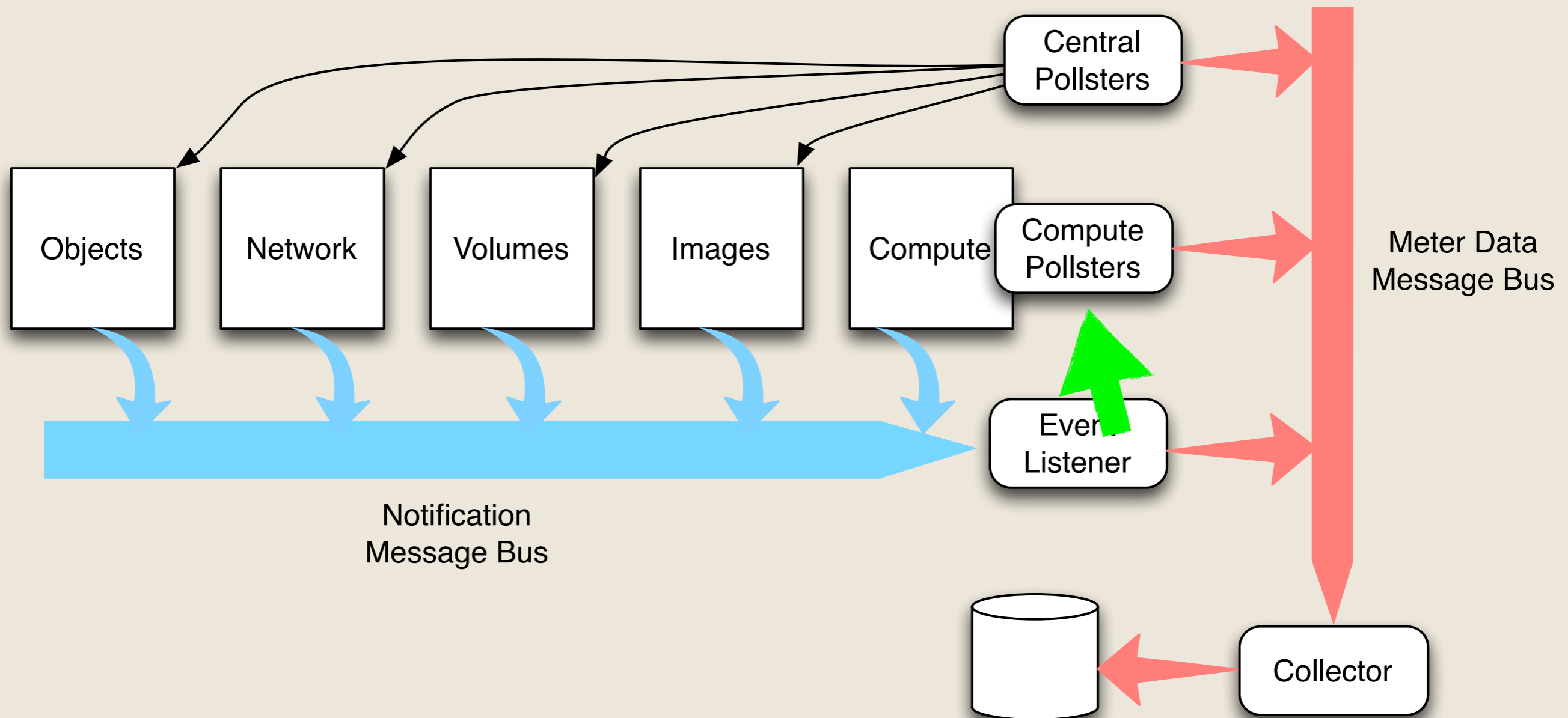




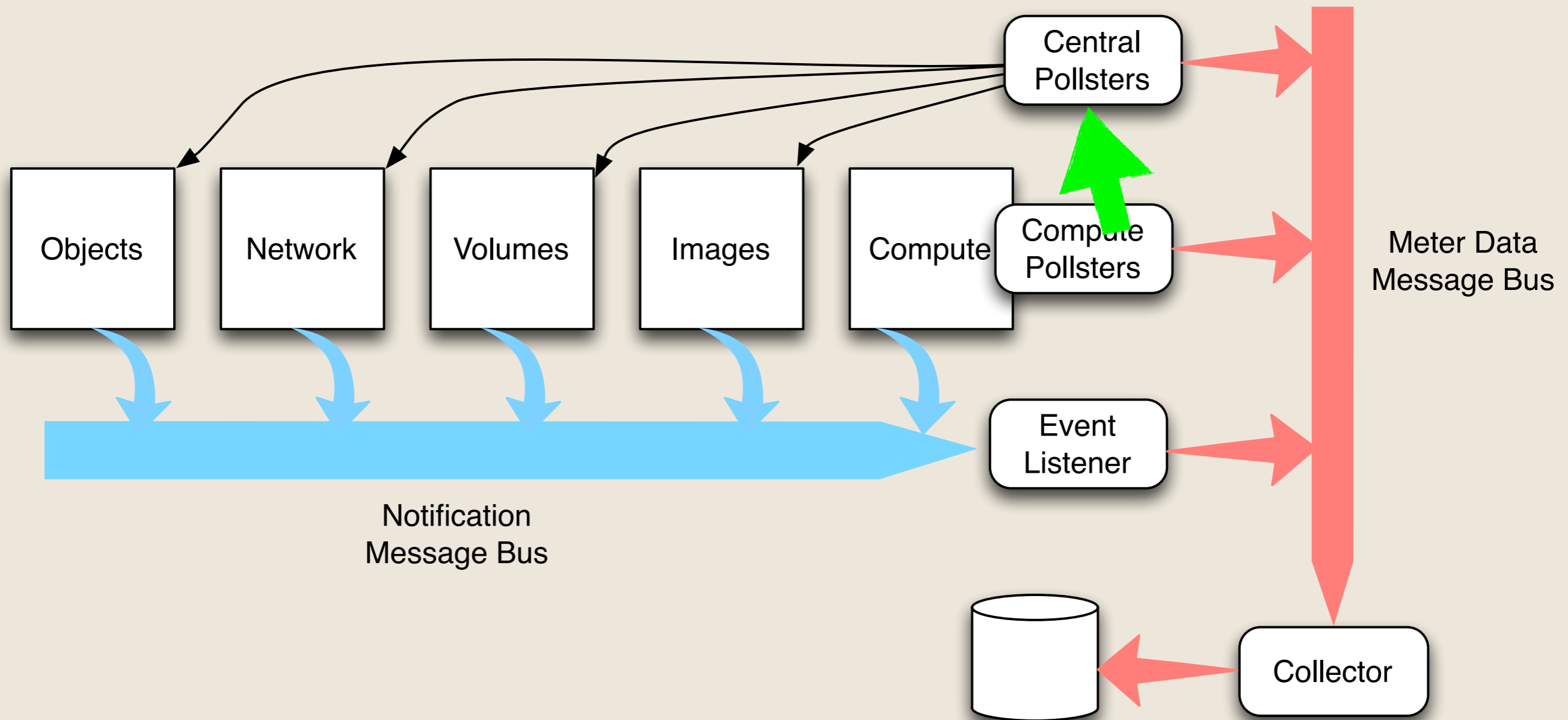
# Ceilometer Design



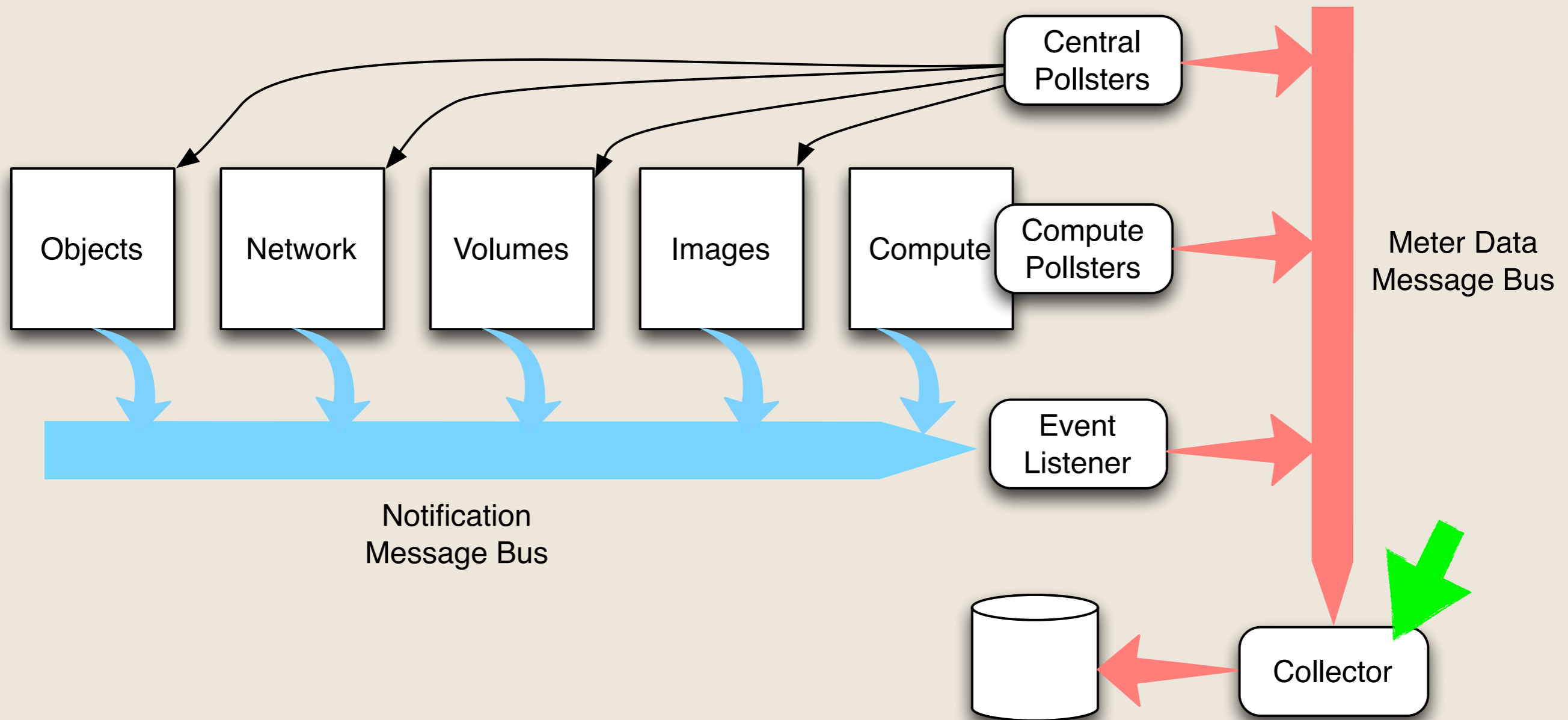
# Ceilometer Design



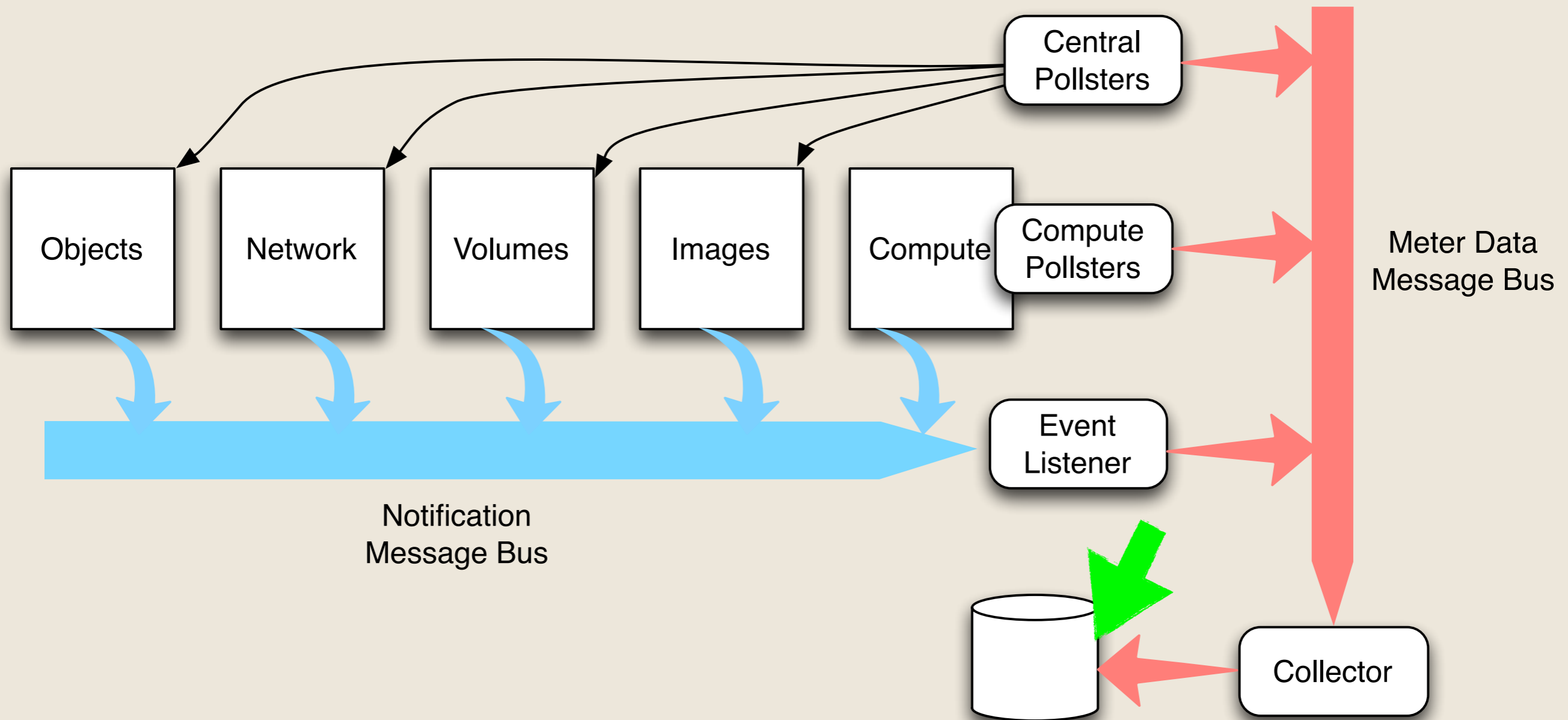
# Ceilometer Design



# Ceilometer Design



# Ceilometer Design



# Ceilometer Plugins

- Message Bus
- Receiving Notifications
- Polling Compute
- Polling Other
- Storage

# Research

- Blogofile
- Sphinx
- Mercurial
- *cliff*
- *virtualenvwrapper*
- Nose
- Trac
- Django
- Pyramid
- SQLAlchemy
- Diamond
- Nova

# Discovery

	Explicit	Scan
File	Mercurial	Diamond Blogofile
Import Reference	Mercurial Django Pyramid Sphinx Nova	Trac Nose <i>cliff</i> <i>virtualenvwrapper</i>



# Enabling

Explicit	Implicit
<p>Django Pyramid SQLAlchemy Blogofile Mercurial Trac Sphinx</p>	<p><i>virtualenvwrapper</i> <i>cliff</i></p>

# Importing

Custom

pkg\_resources

Django  
Pyramid  
Sphinx  
Diamond  
Nova  
Nose  
SQLAlchemy  
Blogofile

Trac  
Nose  
SQLAlchemy  
Blogofile  
*cliff*  
*virtualenvwrapper*

# Integration

	Fine	Coarse
Prompt	Nose <i>virtualenvwrapper</i>	Sphinx Trac
Inspect	<i>cliff</i> Diamond	Mercurial Blogofile Pyramid Django

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# API Enforcement

Convention	Base Class / Interface
<p>Blogofile Mercurial Django Sphinx Pyramid <i>virtualenvwrapper</i></p>	<p>Nose (optional) Trac (interface) Diamond <i>cliff (abc)</i></p>

# Invocation

Driver	Dispatcher	Iterator
SQLAlchemy Nova	Mercurial Django Pyramid <i>cliff</i>	Nose Diamond <i>virtualenvwrapper</i>

# Discovery / Importing

- Entry Points
- Distribute and pkg\_resources
- Be Consistent

# Enabling

- *Explicit disabling*
- *Automatic disabling*



# Integration

- Fine
- Inspect
- Application Owns Relationship

# API Enforcement

- Abstract Base Classes
- Duck Typing

# Invocation

- Storage – Driver
- Notifications – Dispatcher
- Pollsters – Iterator

# stevedore

- Implements Patterns
- Wraps pkg\_resources

# NamedExtensionManager

- Multiple Plugins
- Only Loads Named Plugins
- `map()`

# EnabledExtensionManager

- Multiple Plugins
- Checks Each with Function on Load
- `map()`

# DispatchExtensionManager

- Multiple Plugins
- Invokes Subset on map()

# DriverManager

- Single Plugin
- Direct Access



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[http://packages.python.org/distribute/pkg\\_resources.html](http://packages.python.org/distribute/pkg_resources.html)

<https://github.com/dreamhost/stevedore>

<https://launchpad.net/ceilometer>

<http://doughellmann.com>