



The Gemini Recipe System

A dynamic workflow for automated data reduction

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Objectives

- Automatic near-real time data quality assessment at night
- Automated daytime data quality assessment
- Automated instrument monitoring
- Streamline science data reduction for end-users, regardless of experience
- Open up the possibility to generate science quality data product and distribute those
- Ultimately: increase publication rate resulting from Gemini observation



The Challenge

NIRI+Altair

UT 2005 Sept 28

GMOS-N IFU
white-light image

Michelle
Engineering

NIRI
Spectroscopy

GMOS-N Nod-
and-shuffle
spectroscopy

rie

266 37 393 46



Dynamic workflow

- Makes decision on the fly based on headers and pixels statistics.
- Makes decision on the fly based on data that is or not available.
- Makes decision at the stage of processing where the decision is being made. Nothing is pre-scripted.
- Drastically different from most pipelines out there which process the same type of data over and over again, the same exact way every time.



Instrument-agnostic Programming

AstroData

- Active abstraction for a dataset
- All observatory or instrument specific definitions in external configuration packages
- Lexicon:
 - ***AstroDataType*** libraries for ***classification***
 - ***Descriptors*** libraries for ***uniform metadata elements***
 - ***Primitives*** libraries for ***transformations***



A Scientific Language

- **Recipe**
- Primitive
- Primitive inheritance

Example of a Recipe associated with the GMOS_IMAGE AstroDataType

```
prepare  
overscanCorrect  
biasCorrect  
flatfieldCorrect
```

```
setForFringe  
makeFringe  
fringeCorrect  
setStackable
```

```
display  
detectSources  
measureIQ
```

```
register  
averageCombine  
display  
detectSources  
measureIQ
```



A Scientific Language

Example of a Recipe
associated with the
GMOS_IMAGE AstroDataType

- Recipe
- Primitive
- Primitive inheritance

```
prepare  
overscanCorrect  
biasCorrect  
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setForFringe  
makeFringe  
fringeCorrect  
setStackable
```

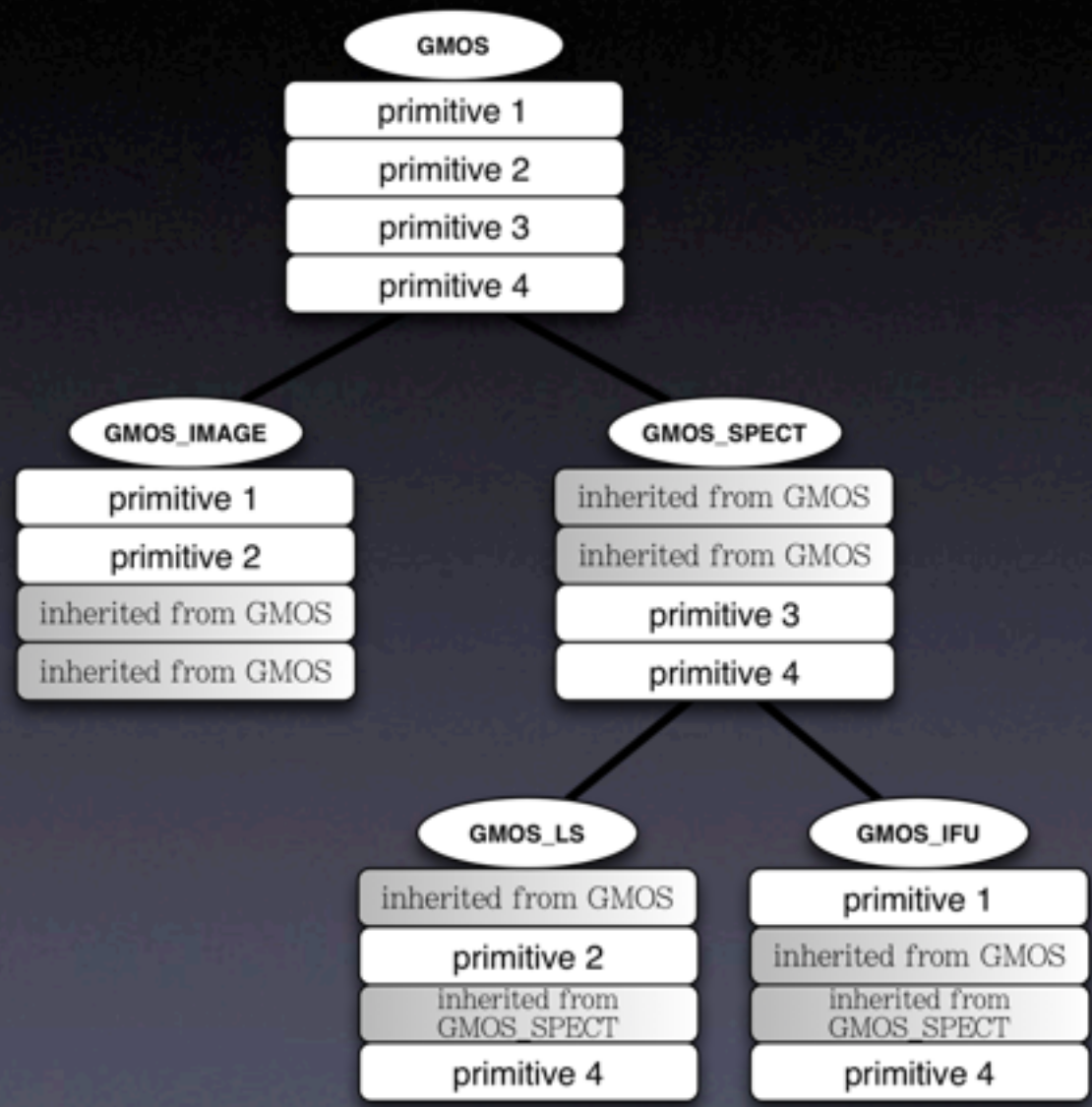
```
display  
detectSources  
measureIQ
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```
register  
averageCombine  
display  
detectSources  
measureIQ
```



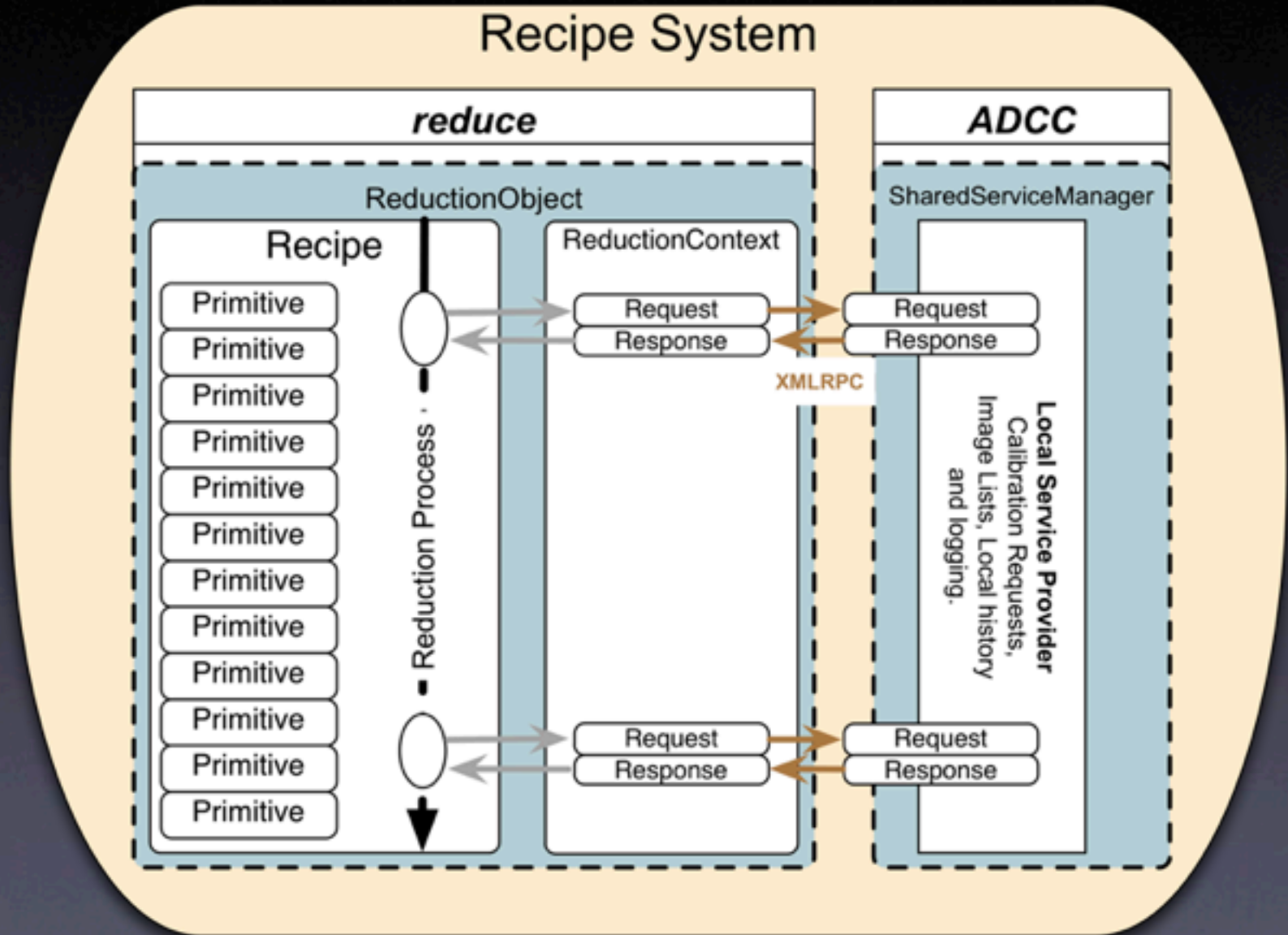
A Scientific Language

- Recipes
- Primitives
- Primitive inheritance



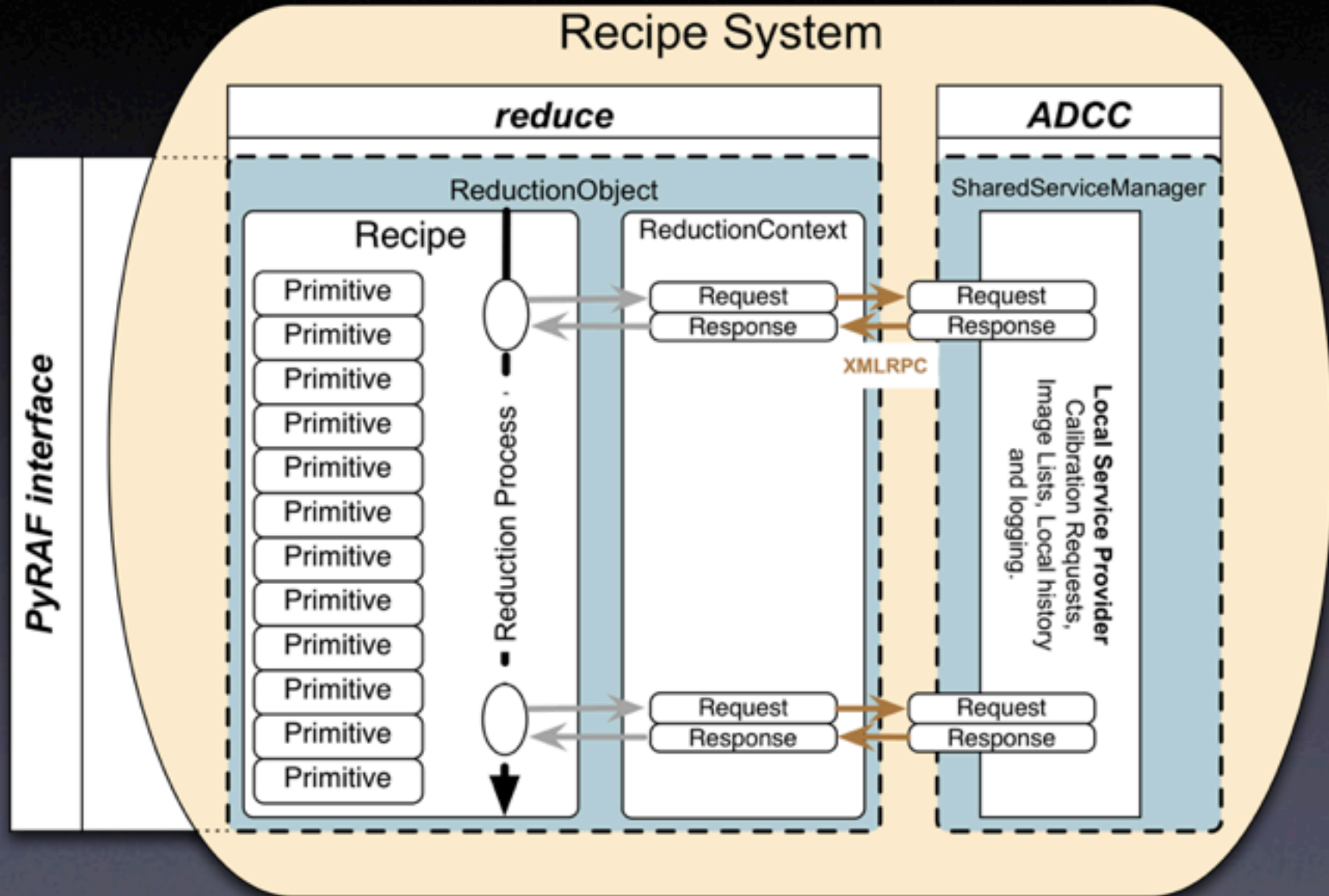


The Recipe System



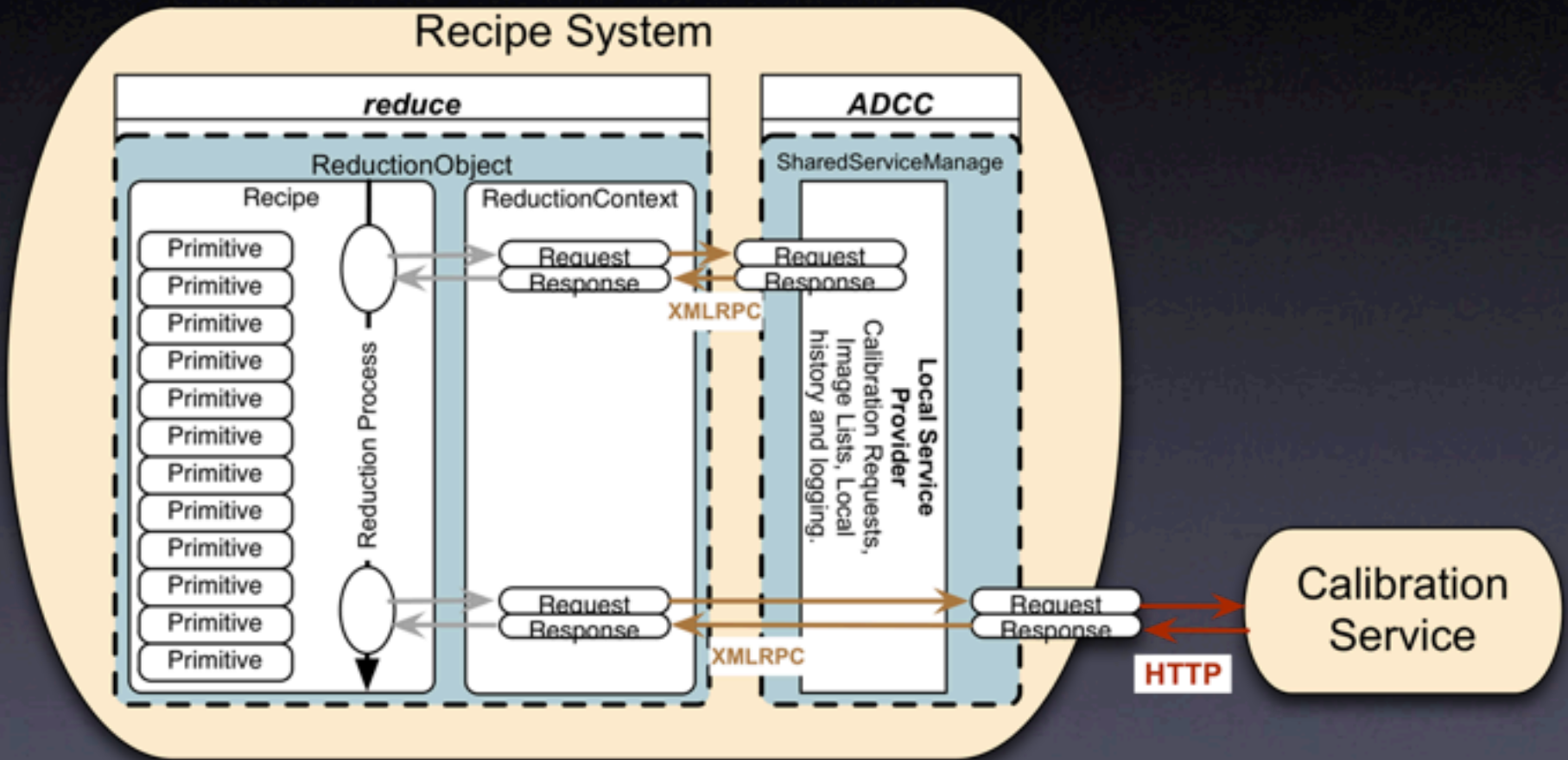


The Recipe System





External Services Access





Summary

Gemini's Recipe System:

- Dynamic workflow. Real-time decisions based on the data characteristics at that point in processing.
- Automated yet highly flexible and customizable system.
- Added interactivity through PyRAF.