NGAP: A (Brief) Update

*PaaS, IaaS, Onboarding, and the Future*

Brett McLaughlin & Andrew Pawloski

NASA EED2/ESDIS

Summer ESIP, 2016
Agenda

• What is NGAP?
• NGAP as a PaaS
• NGAP as an IaaS
• What’s Next?
• Questions and Answers
WHAT IS NGAP?
“NASA Takes Off to Cloud Computing”
* http://www.onthenetoffice.com/blog/2012/02/nasa_cloud/
What is NGAP?

NGAP is the NASA General Application Platform. It provides a cloud-based Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service (IaaS) for ESDIS applications.
NIST Definition of Cloud Computing*

- On-demand self service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

* [http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf](http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf)
NGAP: A (Brief) Update

NGAP AS A PAAS
PaaS
Platform-as-a-Service
It starts with infrastructure…

- It begins with infrastructure, which includes NGAP Orchestration, Provisioning, Deployment & Orchestration, and Request Routing.
- The flow starts with an HTTPS request directed to a Load Balancer.
- The Load Balancer forwards the request to NGAP Router CentOS Servers.
- These CentOS Servers then route the request to the appropriate application (App1 or App2) for processing.

Diagram shows:
- NGAP Orchestration
- CentOS Server
- App1
- App2
- Request Routing
...and adds services and “slugs”

NGAP Services
(Monitoring, Logging, Security, Autoscaling, Billing, etc.)

OCIO GP-MCE*
(AWS Reseller)

- ESDIS “blessed” component

NGAP-compliant AMI
(Application)

NGAP Builder
(Creates “slug” from ECC-hosted codebases)

NGAP Base AMI
(Secure)

ECC
(Code testing, tracking, deployment)

App Source Code

NGAP-compliant AMI
(Application)

NGAP-compliant AMI
(Application)

Usable cloud “platform”

*General Purpose Managed Compute Environment
Highlights of PaaS

- Simplified AWS-focused architecture
- Focused on web application hosting
  - 12-factor applications
  - Web front-end plus database back-end
- Demonstrated Earthdata Search running in NGAP prototype with fault tolerance, high availability, and scaling
NGAP: A (Brief) Update

NGAP AS AN IAAS
AWS and WOS: Benchmarking at the Edges

1. Only Data Cannon will pull from NSG and will push the data to Ingest node(s).
2. All Ingest nodes will write to local storage and update Database for serving.
3. ASF decides where to serve the user, depending on benchmarking, user’s network, etc.

*DC refers to a Datacenter in lower 48 that is not yet defined.*
Forklifting: Not ideal, but sometimes necessary
ASF Pre-NGAP

Developers & SAs

- Configure system
- Setup system tasks
- Deploy “application”

VM

- OS pkg
- OS pkg
- OS pkg
- cron
- code
- code
ASF Today

NGAP Orchestration

Cloud Formation

Bamboo

Configure system

manages

Setup system tasks

Deploy “application”

NGAP VM

OS pkg

OS pkg

OS pkg

cron

code

code

NASA
NGAP: A (Brief) Update

WHAT’S NEXT?
### Identified Profiles

<table>
<thead>
<tr>
<th>Application Profile</th>
<th>Required features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline web application</td>
<td>SQL Database, background jobs, popular language</td>
</tr>
<tr>
<td>Persistent local storage</td>
<td>Fault-tolerant storage that survives instance reboots</td>
</tr>
<tr>
<td>Microservices</td>
<td>Private communication, complex deployment profiles</td>
</tr>
<tr>
<td>Reverse proxy control</td>
<td>Control of traffic at the router level</td>
</tr>
<tr>
<td>COTS Installation / Licensing</td>
<td>Static instances to allow licenses. Limitations in scaling.</td>
</tr>
<tr>
<td>Short lived compute jobs</td>
<td>Fast CPU and network, ephemeral storage, broad use</td>
</tr>
<tr>
<td>Legacy software</td>
<td>Obscure language and hardware support</td>
</tr>
</tbody>
</table>

For additional details, see [https://wiki.earthdata.nasa.gov/display/NGAP/Target+Application+Profiles](https://wiki.earthdata.nasa.gov/display/NGAP/Target+Application+Profiles)
# Identified Applications

<table>
<thead>
<tr>
<th>Application</th>
<th>Model, Profile, and Notable Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASF Web Objects Storage</td>
<td>IaaS, script-based, VMs, S3, and edge storage</td>
</tr>
<tr>
<td>Earthdata Search Client</td>
<td>PaaS, web application, Ruby on Rails, RDS, Node.js, AWS database migration service</td>
</tr>
<tr>
<td>CMR</td>
<td>Hybrid, Clojure API, ElasticSearch cluster, RDS (Oracle), AWS database migration service</td>
</tr>
<tr>
<td>Earthdata Developer Portal</td>
<td>PaaS, web application</td>
</tr>
<tr>
<td>Earthdata Website/CMS</td>
<td>PaaS, web application, Clojure/Ruby on Rails</td>
</tr>
</tbody>
</table>

For additional details, see [https://wiki.earthdata.nasa.gov/display/NGAP/Target+Application+Profiles](https://wiki.earthdata.nasa.gov/display/NGAP/Target+Application+Profiles)
NGAP: A (Brief) Update

QUESTIONS AND ANSWERS
What can I do to prepare?

• Development Best Practices
  – Thoughtful application testing
  – Don’t do it twice; automate

• Deployment Best Practices
  – Configuration Management
  – (More) Automation

• Follow 12-Factor Principles
  – http://12factor.net
NGAP: A (Brief) Update

_PaaS, IaaS, Onboarding, and the Future_

Brett McLaughlin & Andrew Pawloski

NASA EED2/ESDIS

Summer ESIP, 2016

This work was supported by NASA/GSFC under Raytheon Co. contract number NNG15HZ39C
This work was supported by NASA/GSFC under Raytheon Co. contract number NNG15HZ39C