



D2D Testbed

Sanjeev Mohindra and Julie Mullen
MIT Lincoln Laboratory

DISTRIBUTION STATEMENT A. Approved for public release; distributed is unlimited

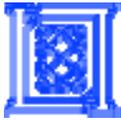
This work is sponsored by the Department of the Air Force under Air Force contract FA8721-05-C-0002. Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the United States Government.

MIT Lincoln Laboratory



Outline

- **Introduction**
- Testbed Overview
- Testbed Architecture
- Initial Testbed Rollout
- Testbed Access
- Summary



Data to Decision Testbed



Special Notice 11-SN-0004

Special Program Announcement for 2011 Office of Naval Research
Applied Research

“Data to Decision”

D2D testbed is a government-owned prototype of the Data to Decision platform.



Data to Decision Platform



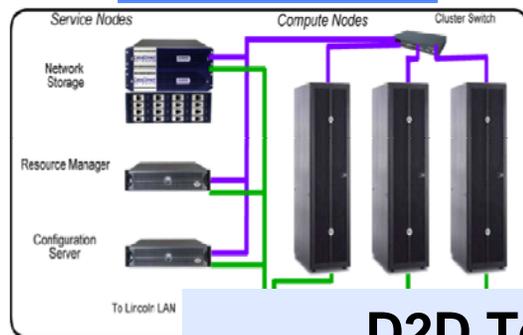
Data, Apps, Software Infrastructure

Distribution

D2D Platform

Hardware Infrastructure

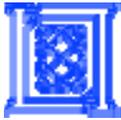
Community



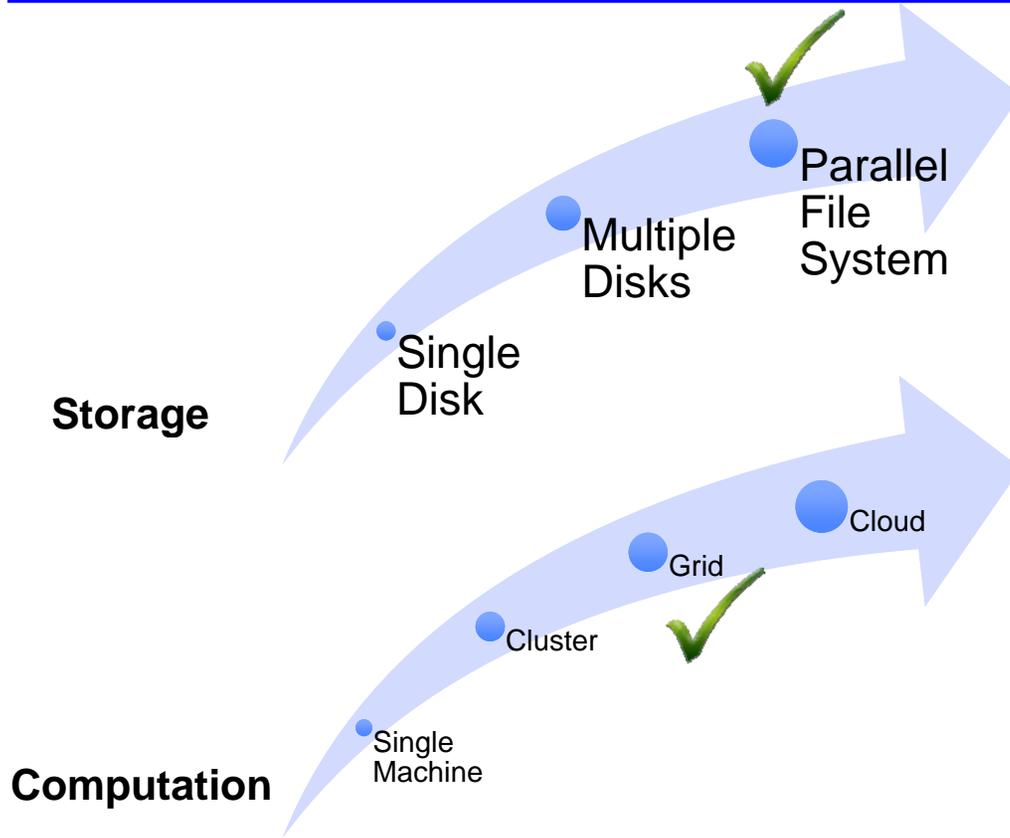
Utility Computing
High Performance Computing



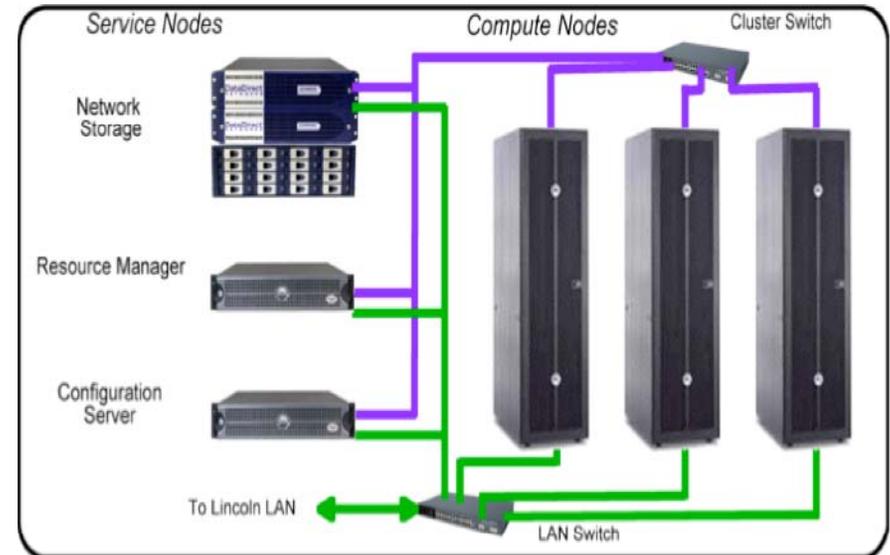
D2D Testbed hosts data and applications and provides storage and compute resources



Scalable Infrastructure



LLGrid



Cluster(s)	TX-X	TX-DoD
Classification	External	Restricted
Compute Nodes	120	35
TFLOPs	3.1	0.9
Central Storage (TB)	14	8
Distributed Storage (TB)	9	12

Infrastructure supports storage and computation on large data

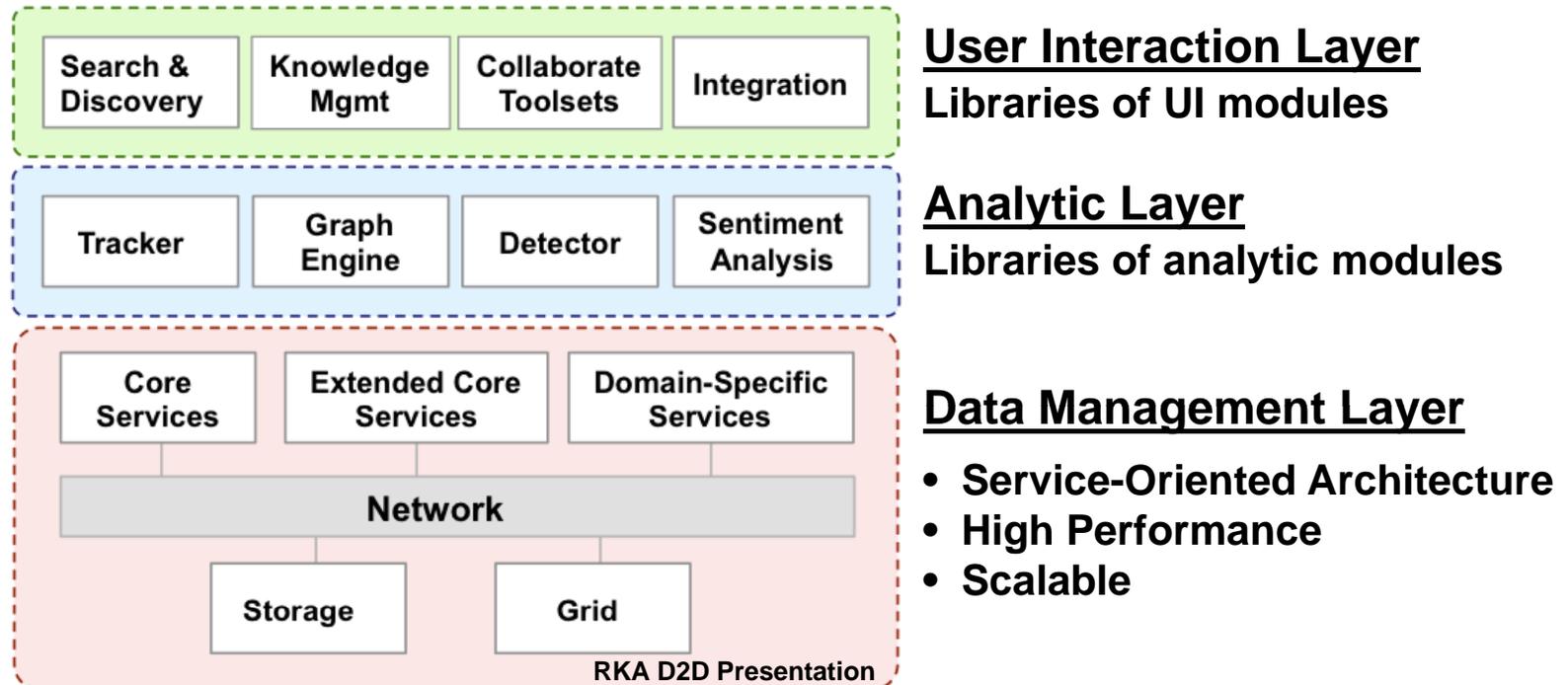


Outline

- Introduction
- **Testbed Overview**
- Testbed Architecture
- Initial Testbed Rollout
- Testbed Access
- Summary



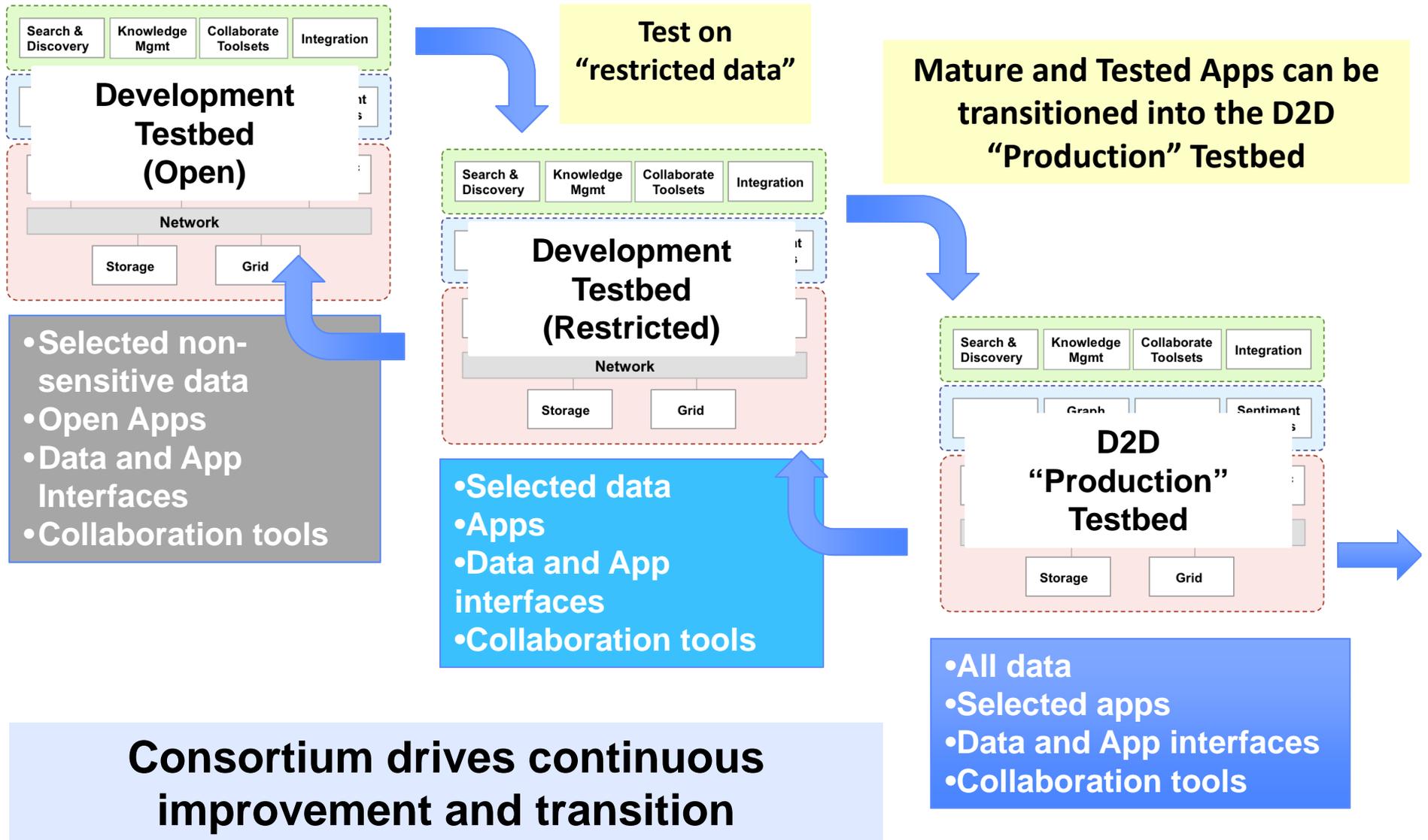
D2D Testbed Layer Diagram



Testbed users should be able to access data; build and consume analytic services; and interact with data and services.



Testbed Management



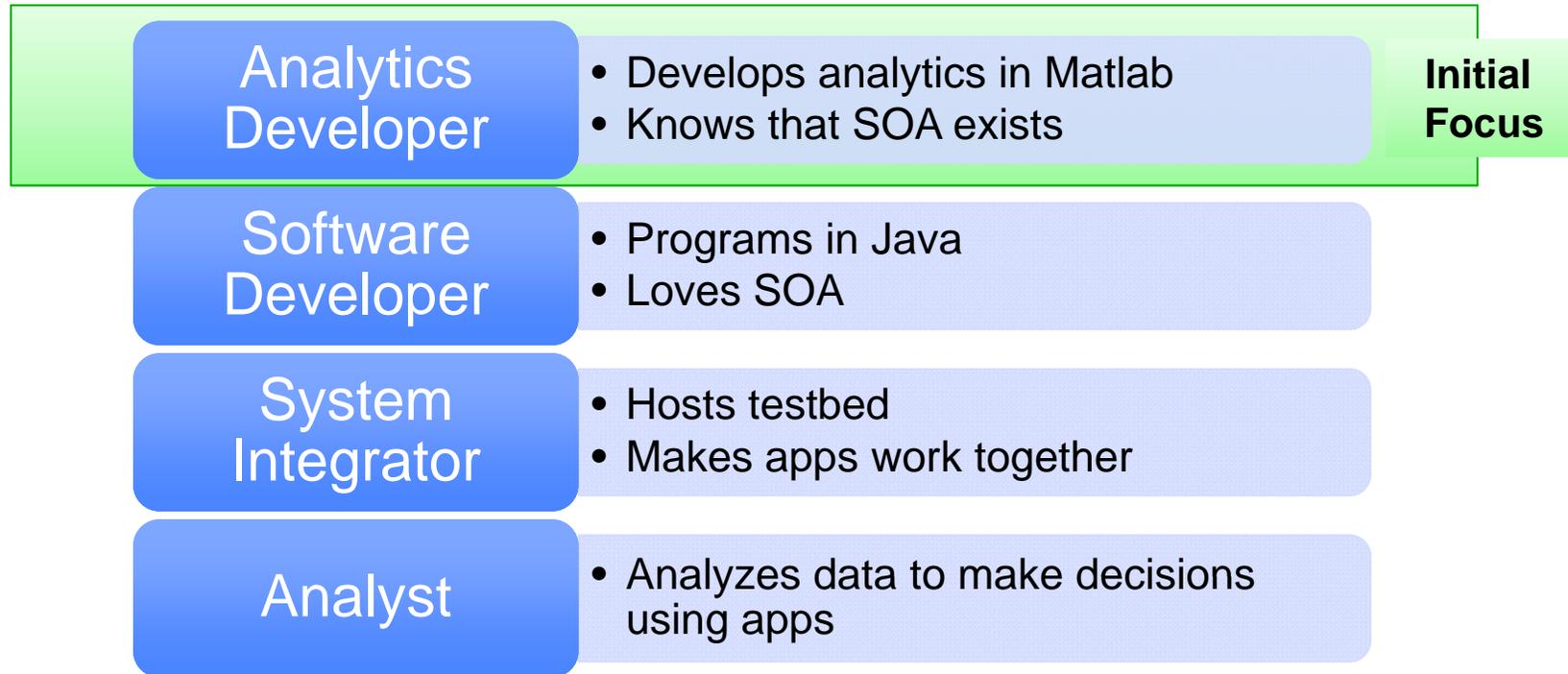


Outline

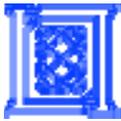
- Introduction
- Testbed Overview
- **Testbed Architecture**
- Initial Testbed Rollout
- Testbed Access
- Summary



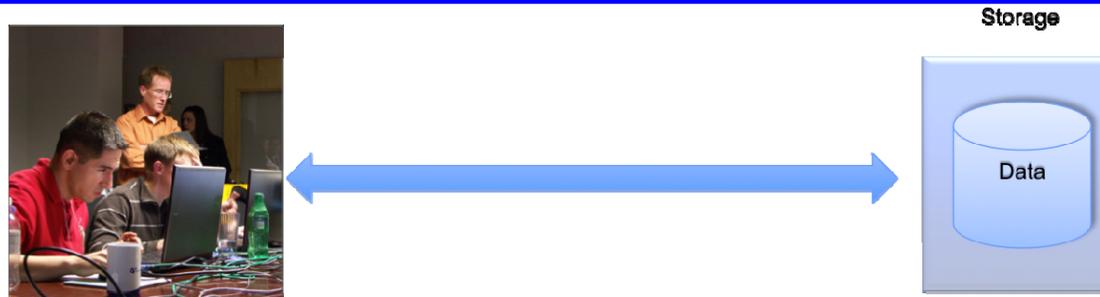
Types of Testbed Users



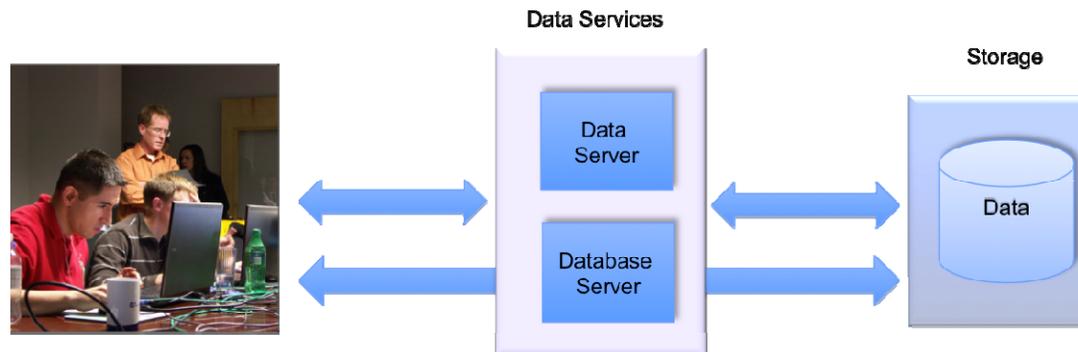
Architecture should keep the needs of various users in mind



Data as a service



- Users can mount data on their client machines
- Apps can access data as if it were local

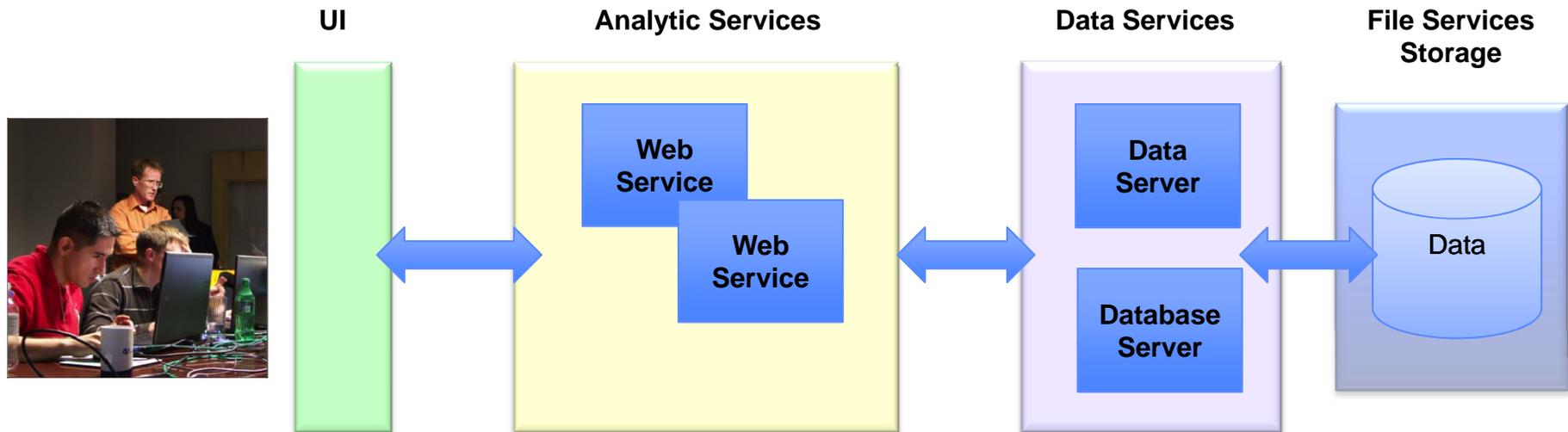


- Users can request data through local or remote service apps
- Apps can access through other data service apps
- Data, and data services can be at different locations

Provides users with access to data hosted on testbed

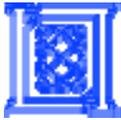


Analytics as a service

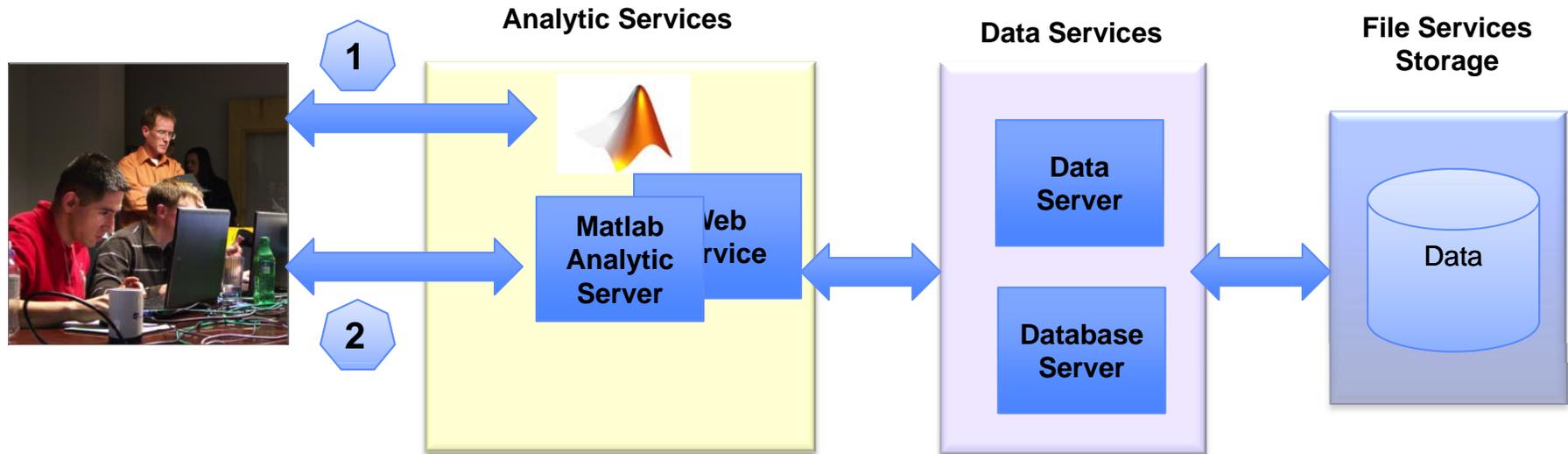


- Analytic services interact with data directly or through data services
- Client user interaction apps interact with analytic apps
- Users can run analytic apps locally or remotely
- Running analytic apps on the testbed provides data locality and scalability

Users can build and consume analytic services



Matlab Analytic Server



- Analytic Developer builds apps in Matlab
- To convert to analytic services:
 1. Write a Matlab calling function and simply place the Matlab code at a known location
 2. The Matlab calling function is automatically exposed as a web service, that can be called using RESTful web service calls

Analytic developer can focus on algorithms



Outline

- Introduction
- Testbed Overview
- Testbed Architecture
- **Initial Testbed Rollout**
- Testbed Access
- Summary



Initial Testbed Rollout

CLIENT MACHINE



Data Services§

- Image server

Analytic Apps§

- Region tracker
- Entity tracker

API

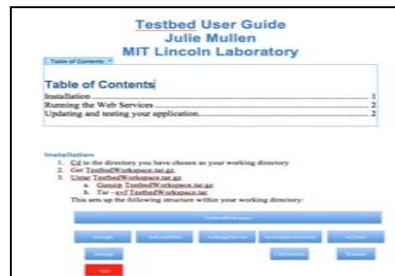
- Region tracker
- Entity tracker
- Image server

For Analytic Developer

Secure Connection

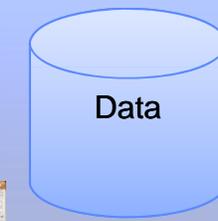
Mount Data remotely

Forge Collaboration Version Control



TESTBED

File Services Storage

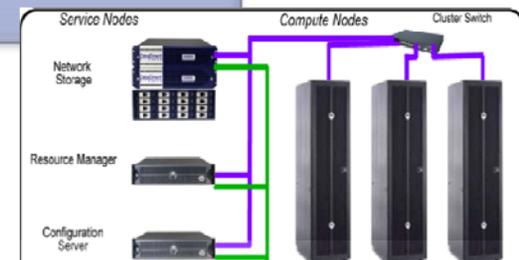


Data Services§

- Image server

Data§

- Bluegrass data
- Other data

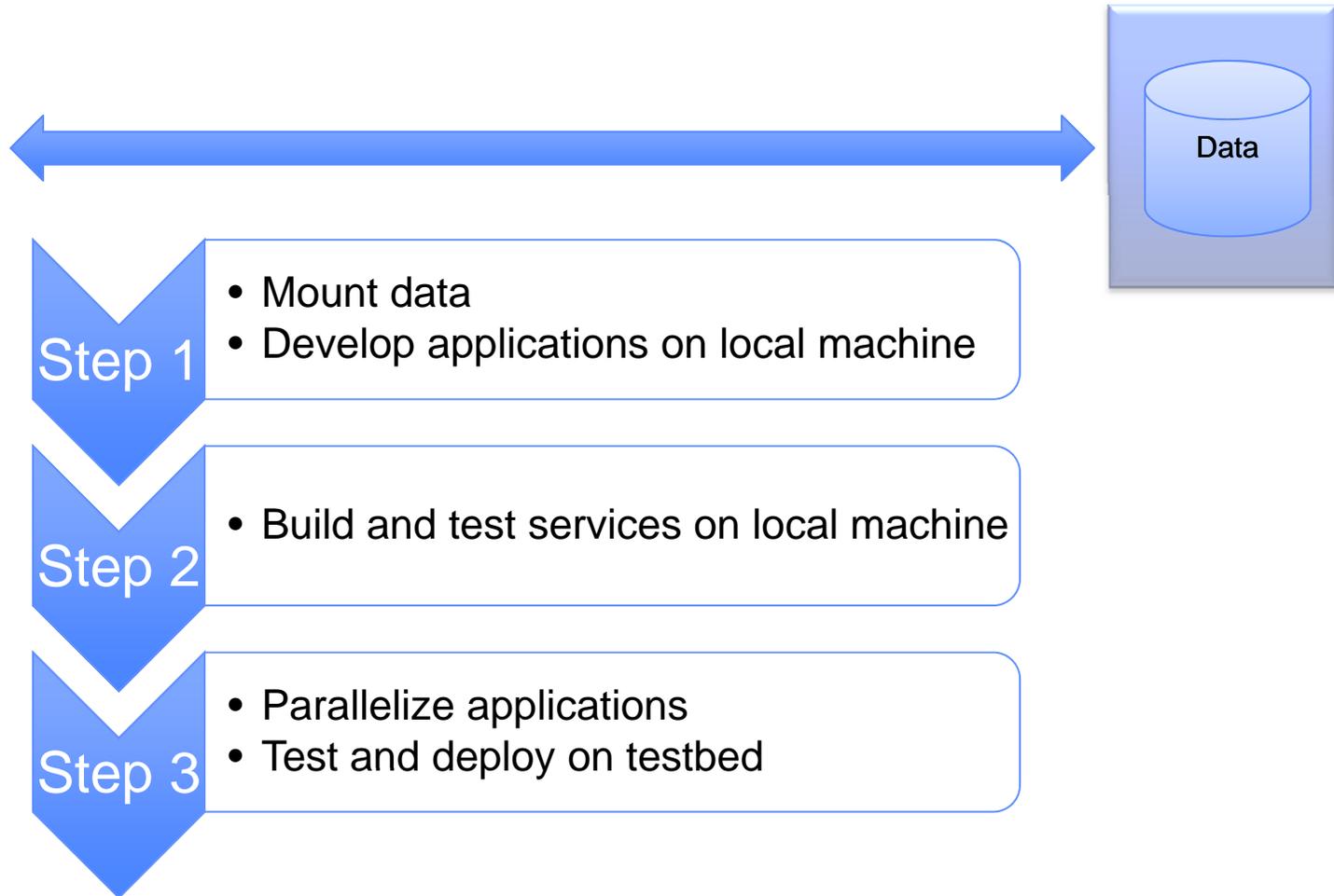


Cluster(s)	TX-X	TX-DoD
Classification	External	Restricted
Compute Nodes	120	35
TFLOPs	3.1	0.9
Central Storage (TB)	14	8
Distributed Storage (TB)	9	12

§Some data and apps only made available on the restricted testbed



Recommended Practices



Don't let these get in the way of progress



Outline

- Introduction
- Testbed Overview
- Testbed Architecture
- Initial Testbed Rollout
- **Testbed Access**
- Summary



Initial Testbed Rollout

CLIENTS



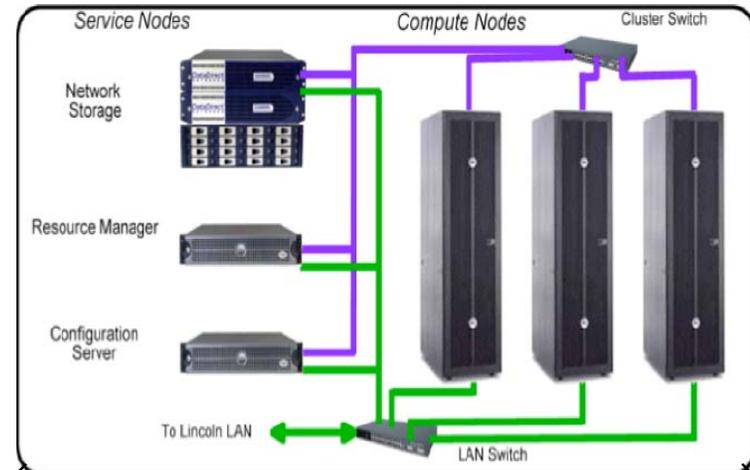
For Analytic Developer

Secure Connection

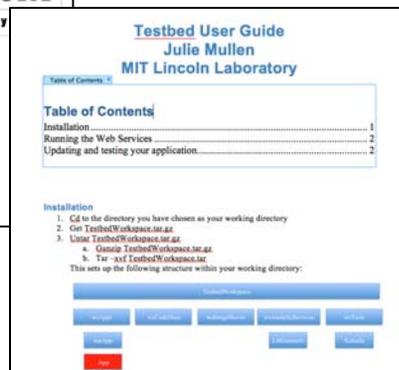
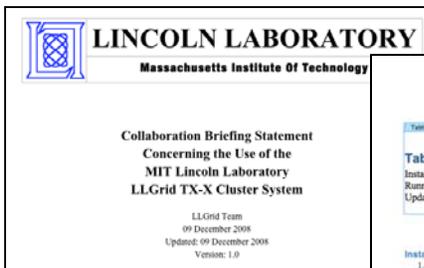


Mount Data remotely

- Requesting an Account
- Accessing the Testbed
- Use Policies



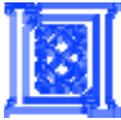
Cluster(s)	University	Government
Classification	External	Restricted
Compute Nodes	120	35
TFLOPs	3.1	0.9
Central Storage (TB)	14	8
Distributed Storage (TB)	9	12





Requesting Access to the D2D Collaborative Environment

- **Proposed user must**
 - Complete Account Request Form which asks for:
 - User's Name
 - User's Status (e.g. Consultant, Subcontractor, Student)
 - User's Citizenship
 - User's company or organization
 - Period of time that account needs to be active
 - Not share the account with colleagues or students
 - Restrict their cluster use to program related work
- **Testbed team will provide**
 - Datasets
 - Image and Analytical Web Service Interfaces
 - User Guides for
 - Accessing and using the Testbed cluster
 - Using the Testbed infrastructure to develop services



Accessing the Testbed



Connect via ssh
Requires:

- User Name
- Pin
- SecureID





Mount the Testbed File System in Your Local Workspace

The screenshot shows the Macfusion application window with two SSH volumes. The first volume, 'len_home (Mounted)', is connected to 'XXXXXX@login.llgrid'. The second volume, 'XXXXXX (Unmounted)', is connected to 'XXXXXX@XXXXXXXXXX'. Below the Macfusion window is the MATLAB 7.10.0 (R2010a) interface. The Command Window shows a warning message: 'Warning: /Volumes/juv9514/matlab software to path. > In startup at 61 In matlabrc at 224'. The Current Folder window shows a directory listing: 'wsAnalyticService', 'wsApps', 'wsCodeDocs', 'wsImageServer', and 'wsTools'.

Mount Testbed File system on local machine

Drag & drop files

Run services



Outline

- Introduction
- Testbed Overview
- Testbed Architecture
- Initial Testbed Rollout
- Testbed Access
- **Summary**



Summary

- **Testbed architecture provides a way for users to access data; build, consume and host analytic services; and interact with data and services.**
- **Analytics developer can focus on developing algorithms, and leave the SOA aspects to the testbed middleware**
- **The final testbed architecture can be hosted at any government team member site.**
- **Testbed will be online before the performers are selected**