MATLAB CONFERENCE 2017

Integrating MATLAB Analytics into Enterprise Applications

David Willingham

Run this link….

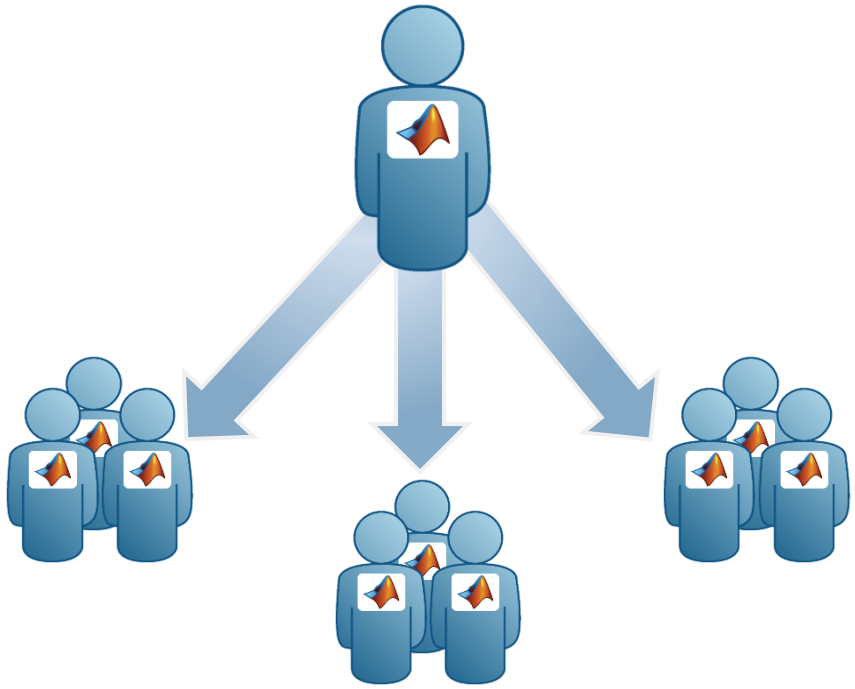
http://bit.ly/matlabapp

Key Takeaways

1. What is Enterprise Integration
2. What is an Enterprise Application
3. How MATLAB streamlines Enterprise Integration

What is Enterprise Integration (Deployment)?

Share With Other Users



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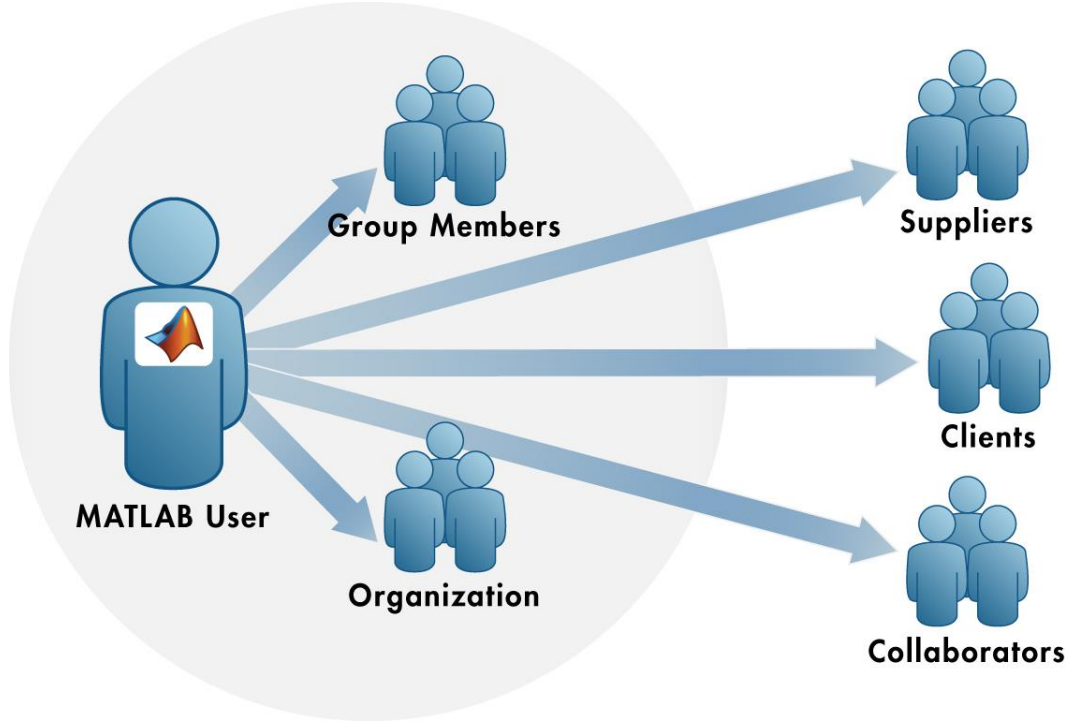


Jaguar Land Rover Standardizes on MATLAB for Developing, Packaging, and Sharing Engineering Tools

Challenge

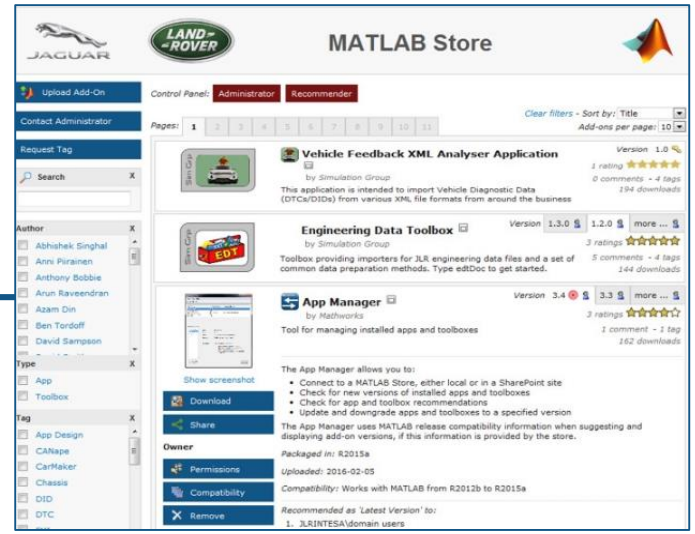
Minimize the use of disparate tools and manual processes for data analysis to reduce duplication of effort and increase productivity

Solution

Standardize on MATLAB for developing engineering data analysis tools and work with MathWorks consultants to develop an app store for sharing and distributing those tools

Results

- Tool quality improved and tool development time reduced
- Collaboration and engineering productivity increased
- Reliance on third-party software tools reduced



Jaguar Land Rover's MATLAB App Store, which provides one-click download and install of ready-to-use engineering tools, authored by their engineers for their engineers

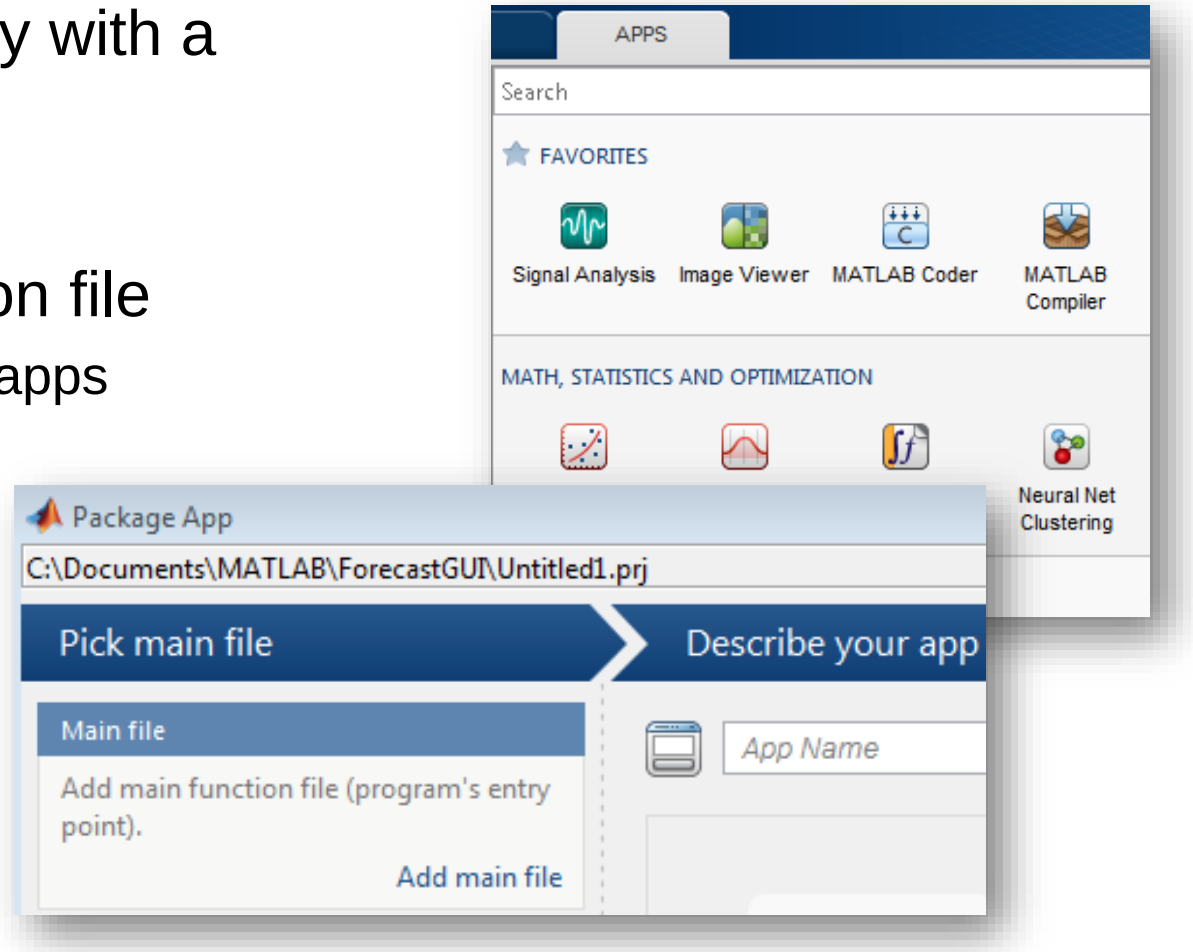
In addition to avoiding duplication of effort, the MATLAB App Store enables engineers to become productive more quickly. New engineers can get the tools they need to do their jobs within minutes.

Link to user story

Share with other Users - App Packaging

- Apps are self-contained tools, typically with a User Interface

- Package your app as single installation file
  - Easy distribution and installation into the apps gallery
  - Automatically includes all necessary files
  - Documents required products

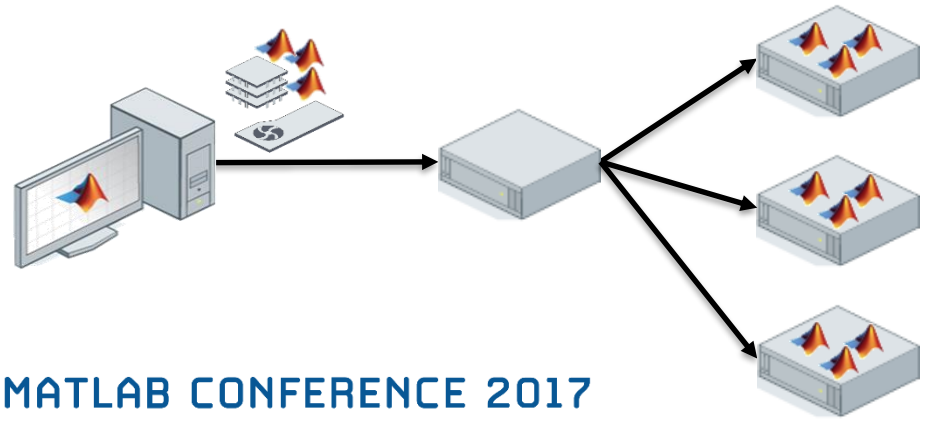


Share with other People

- Desktop / Web app
- Dashboard
- Mobile app

What is an Enterprise Application?

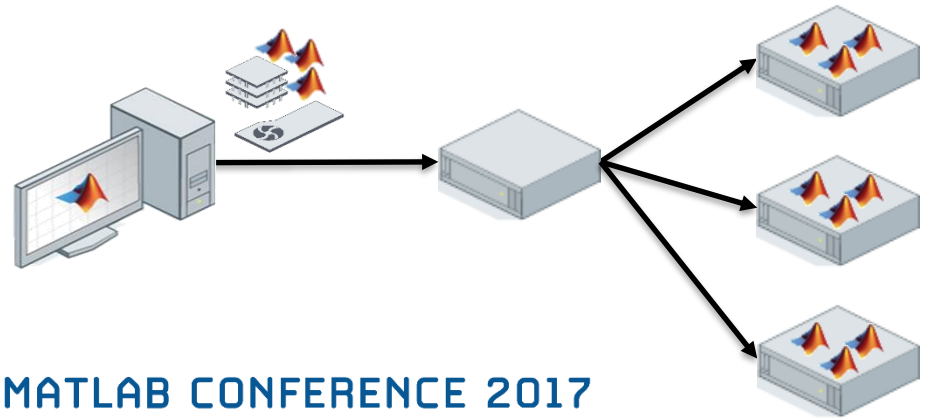
- **Deploying (or integrating) to an end application or device**



- **Deploying to a High Performance Computing (HPC) Server**

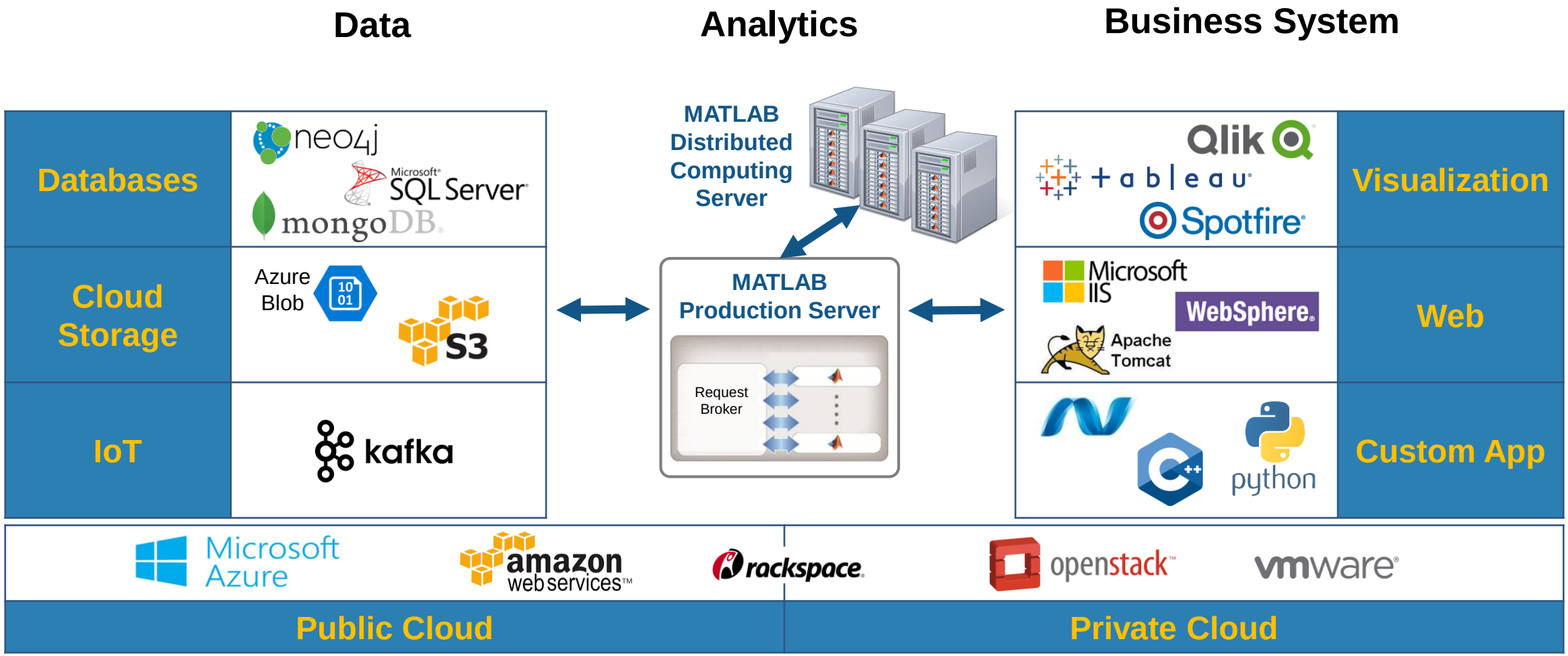
What is an Enterprise Application?

- **MATLAB Enterprise Production Deployment**
  MATLAB Production Server™



- **MATLAB High Performance Computing**
  MATLAB Distributed Computing Server ™

Enterprise Technology Stack



Run this Link…

http://bit.ly/spotfirematlab

User: jb

PW: matlab

MATLAB *and MATLAB Production Server*

is the easiest and most productive environment to *take your enterprise analytics* or *IoT solution* from idea to production

Idea **Production**

Why MATLAB Production Server Matters to You

Domain Expert

- ✓ MATLAB Production Server allow you to continue to work in the environment that you love
- ✓ No need to learn another programming language
- ✓ MATLAB Production Server integrates with enterprise IT infrastructure

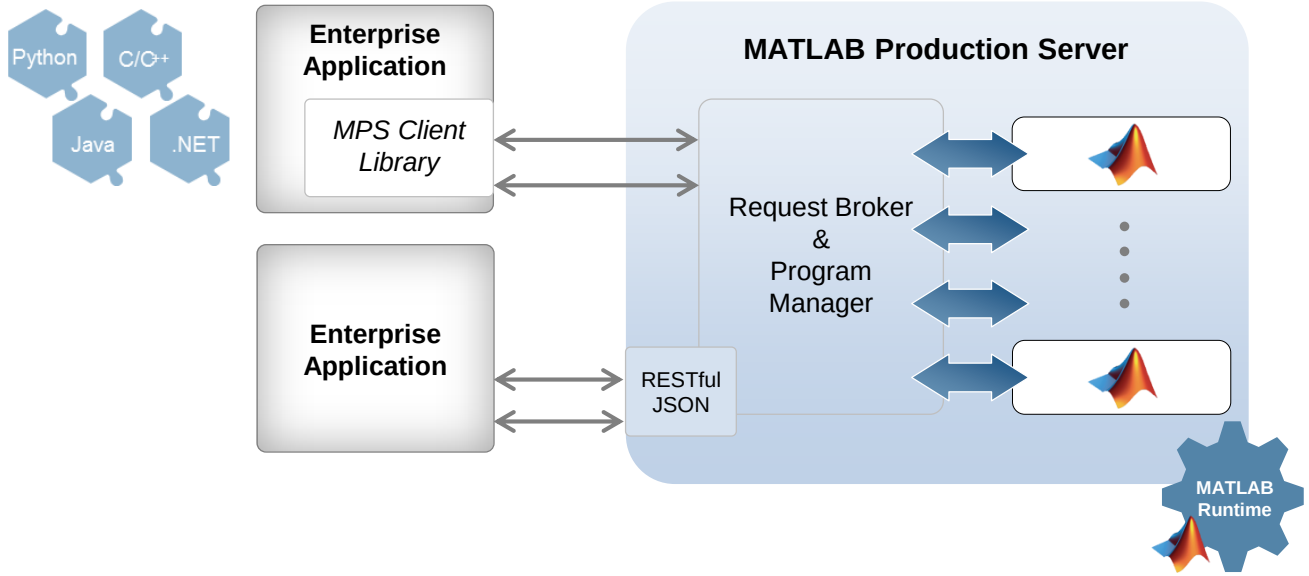
Solution Architect

- ✓ MATLAB Production Server integrates MATLAB code into the enterprise IT fabric that you are comfortable with
- ✓ No need to re-code into another programming language
- ✓ Web and cloud friendly architecture

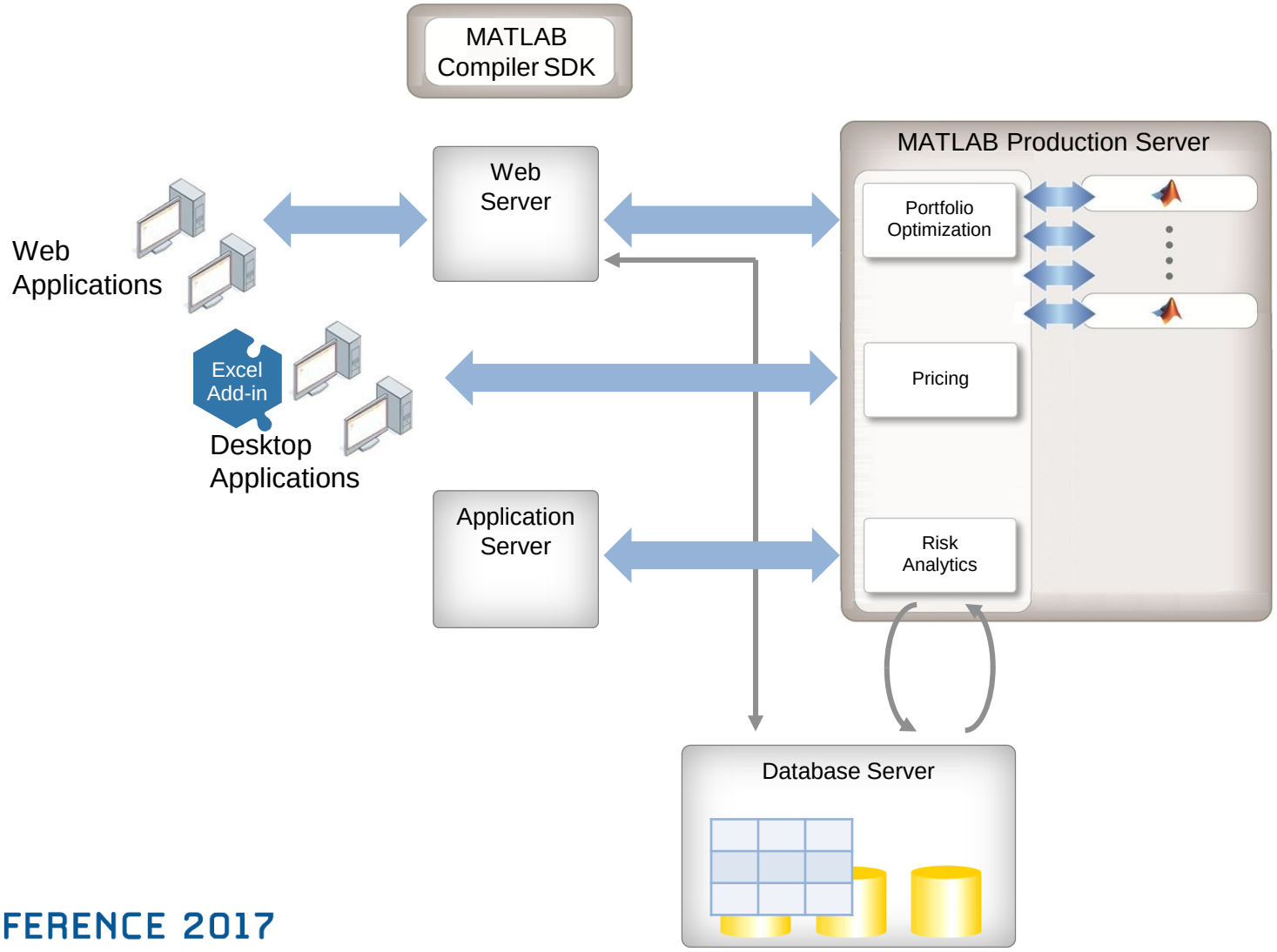
MATLAB Production Server

Enterprise Class Framework For Running Packaged MATLAB Programs

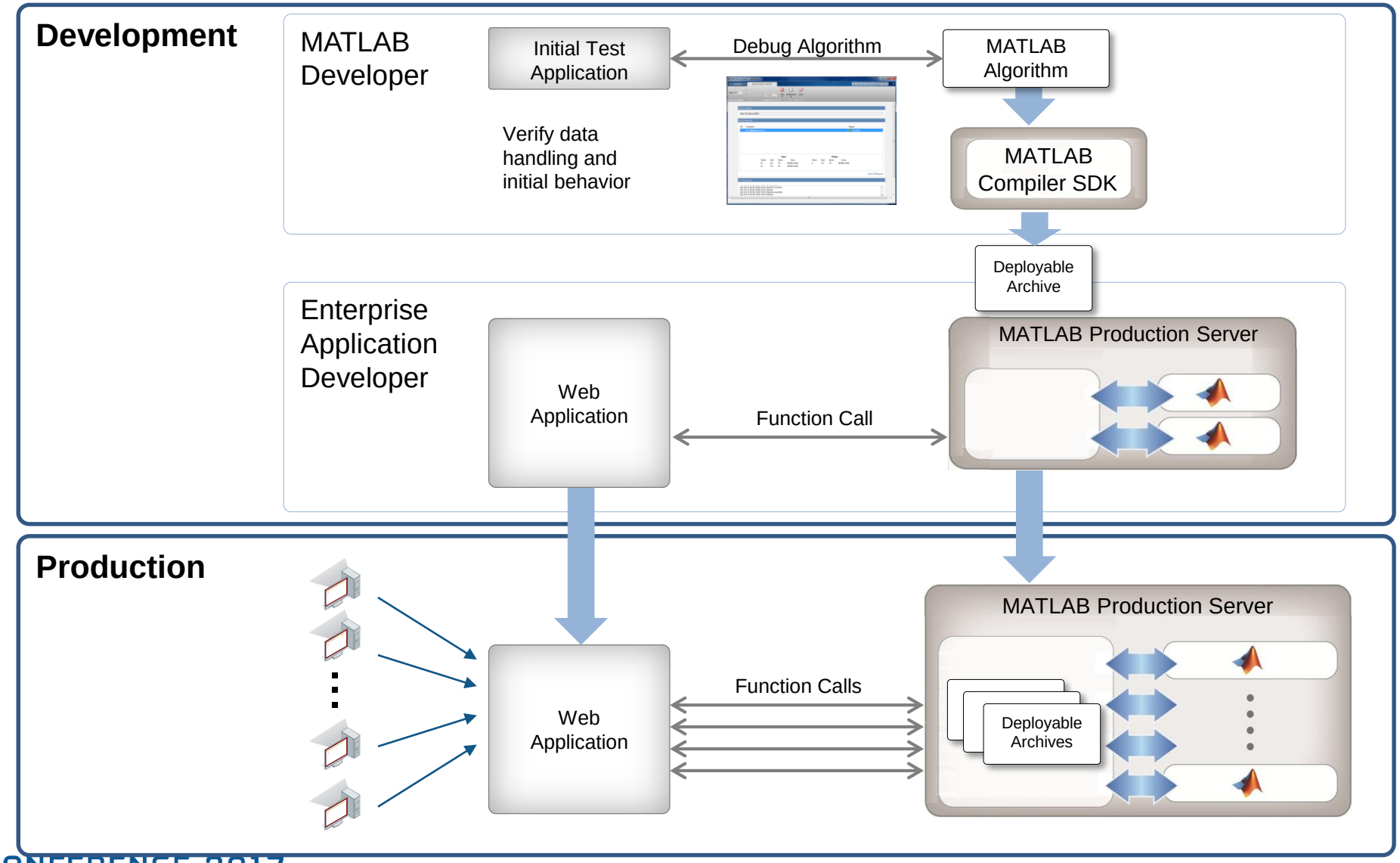
- Server software
  - Manages packaged MATLAB programs and worker pool
- MATLAB Runtime libraries
  - Single server can use runtimes from different releases
- RESTful JSON interface and lightweight client library (C/C++, .NET, Python, and Java)



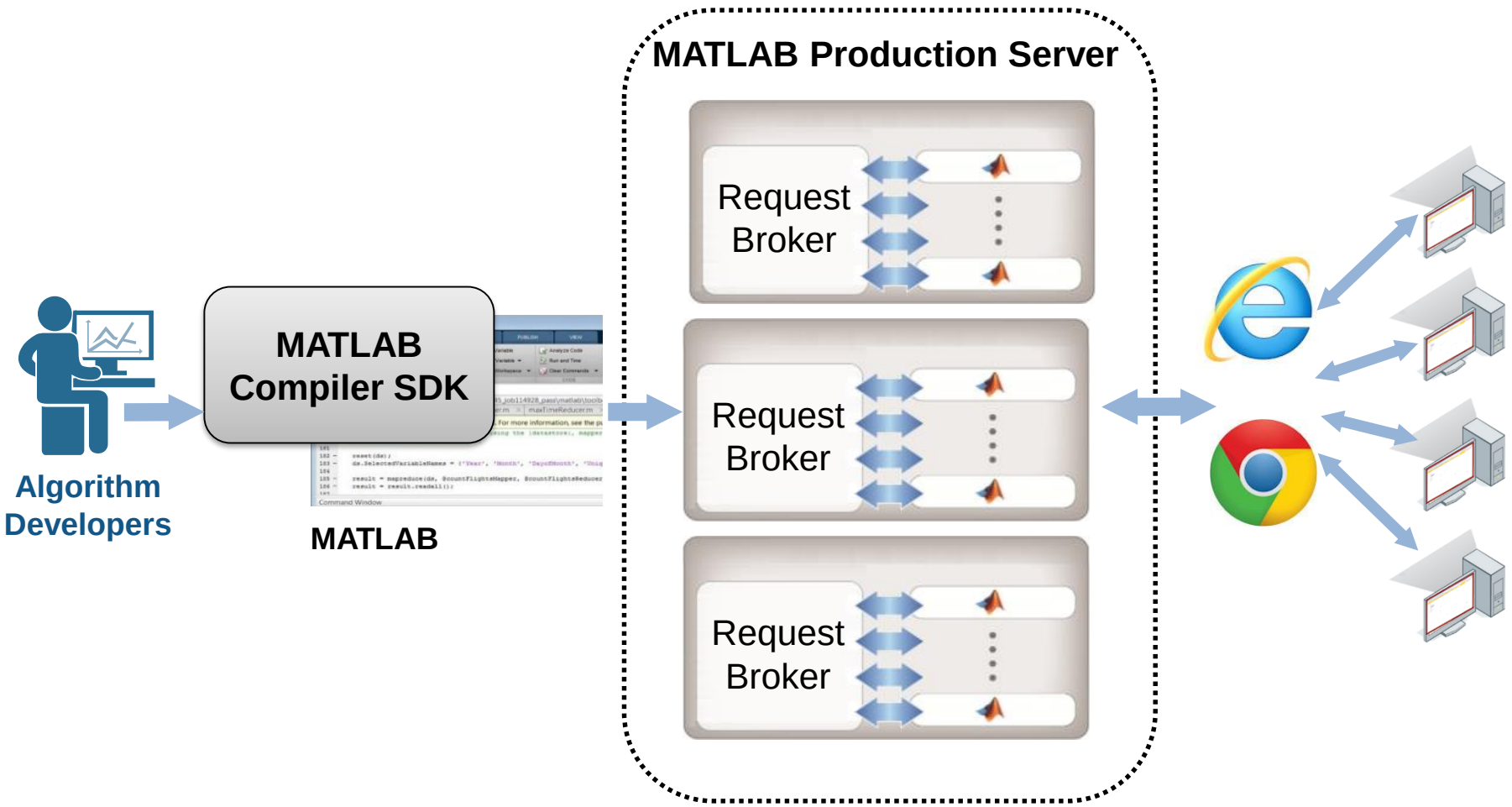
Integrating with IT systems



Production Deployment Workflow



Customer example: Rabobank



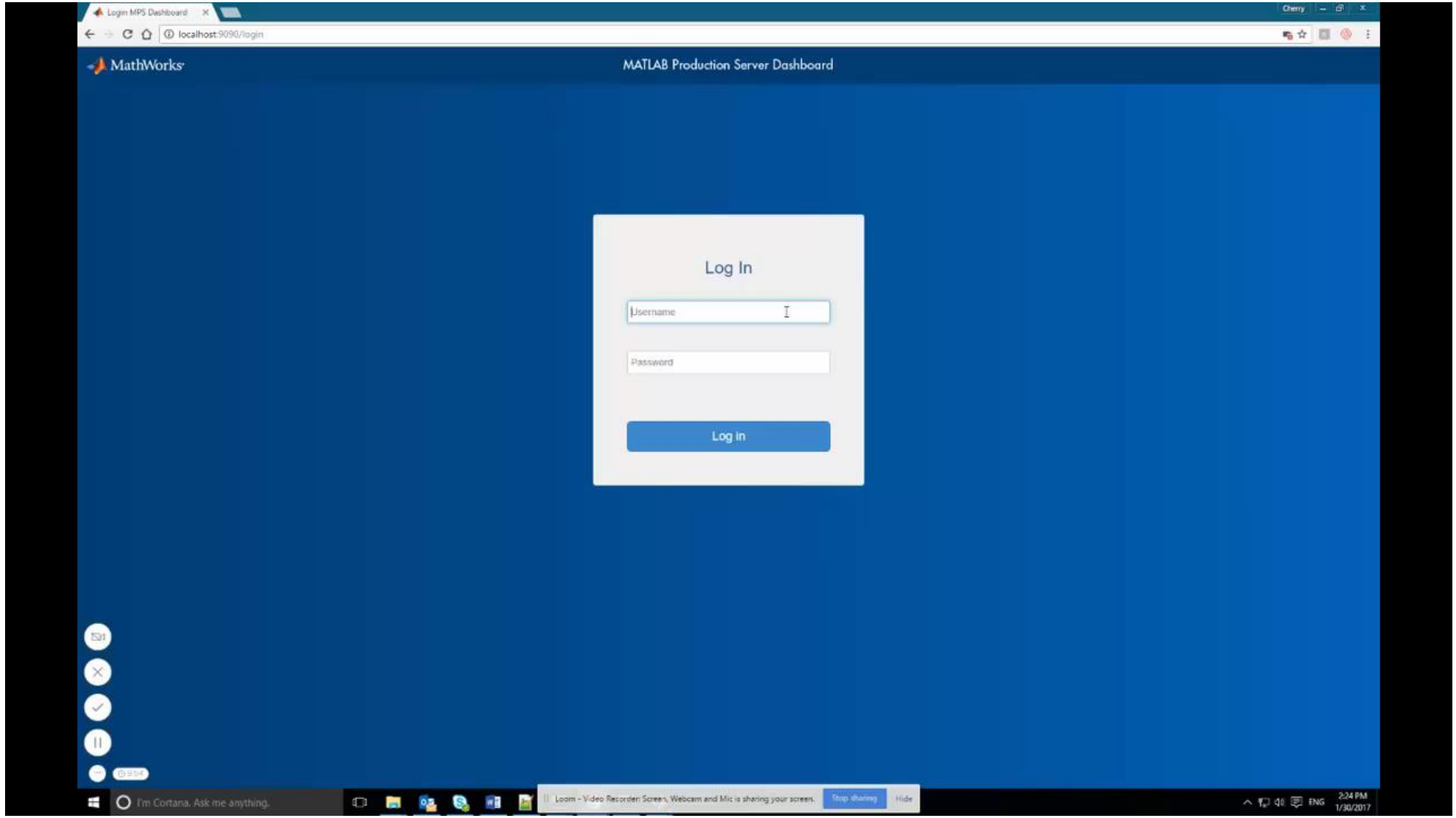
Global financial institution with European HQ

- Saved **€ 2 million annually** for an external system
- Quicker implementation of adjustments in source code by the quantitative analysts
- Knowledge + MATLAB = Build your own systems

Link to 2016 MATLAB Finance User Conference Slides

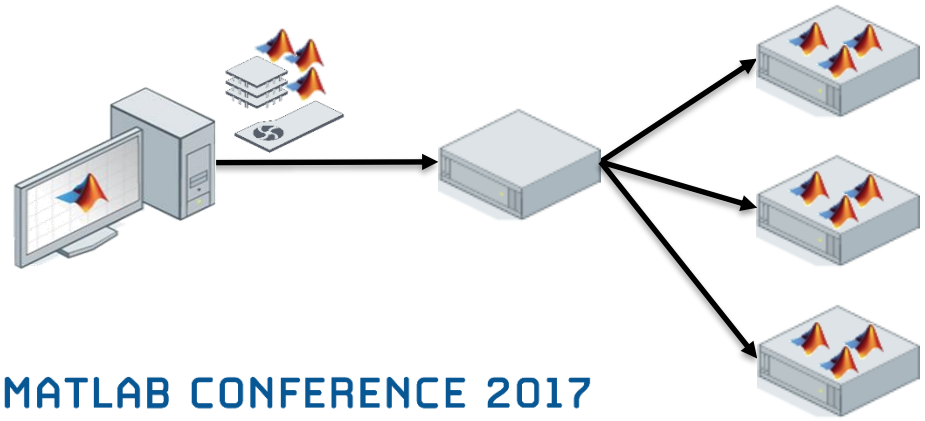
MATLAB Production Server Live Example

Web Management Dashboard – New in R2017a



What is an Enterprise Application?

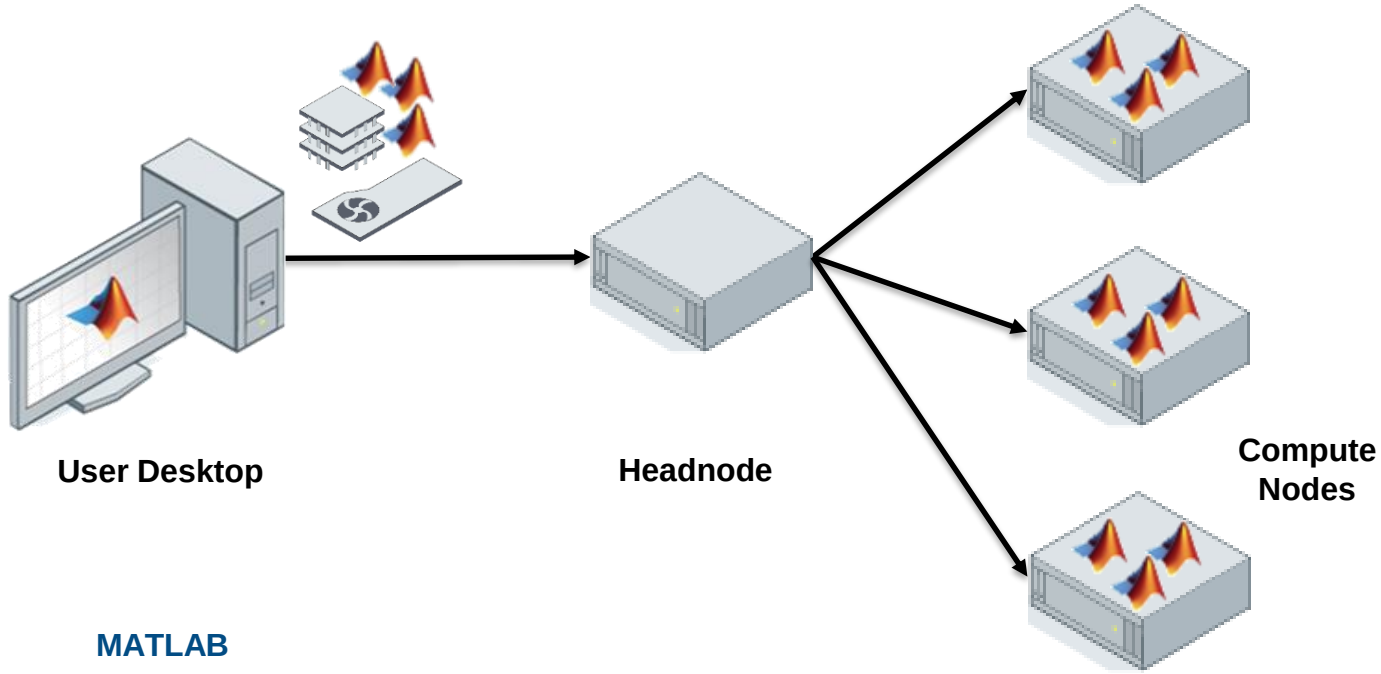
- **MATLAB Enterprise Production Deployment**
  MATLAB Production Server™



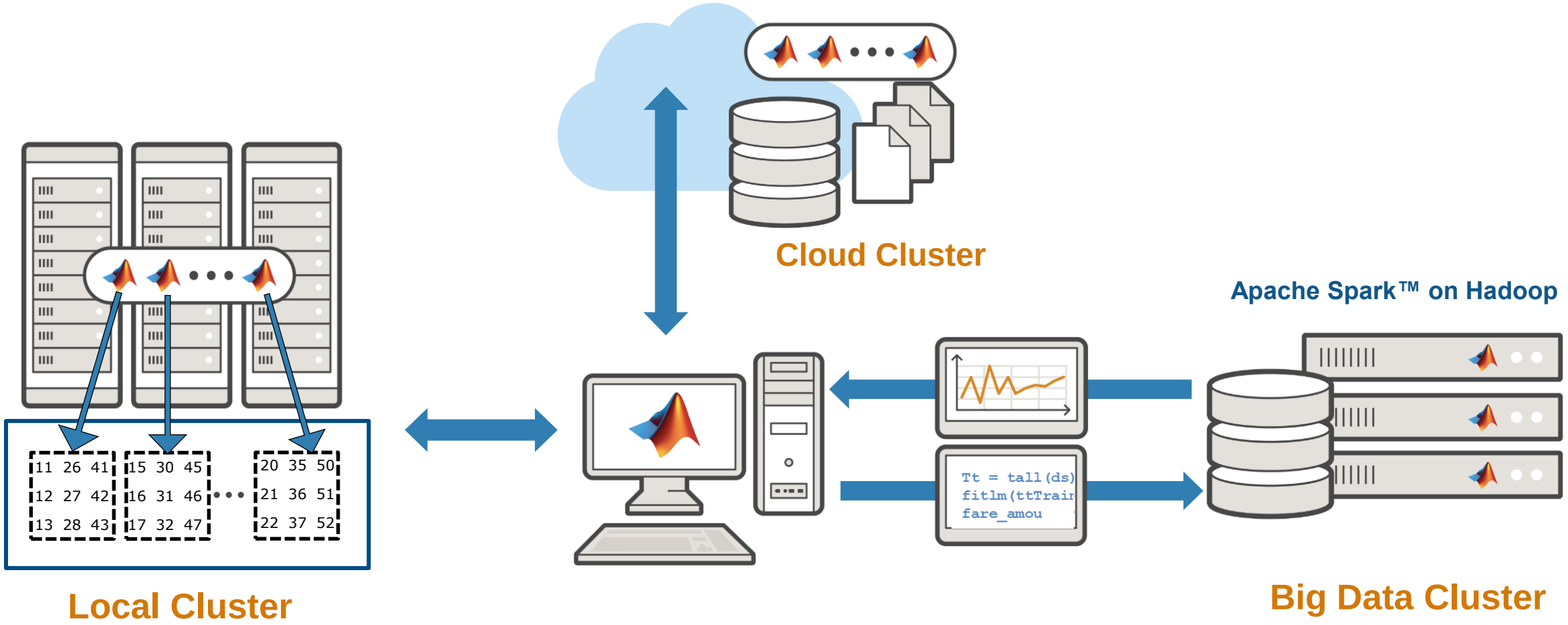
- **MATLAB High Performance Computing**
  MATLAB Distributed Computing Server ™

MATLAB High Performance Computing
MATLAB Distributed Computing Server

- Prototype on the desktop
- Integrate with existing infrastructure
- Access directly through MATLAB



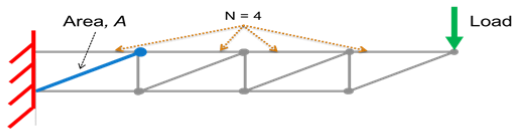
HPC & Big Data capabilities in MATLAB

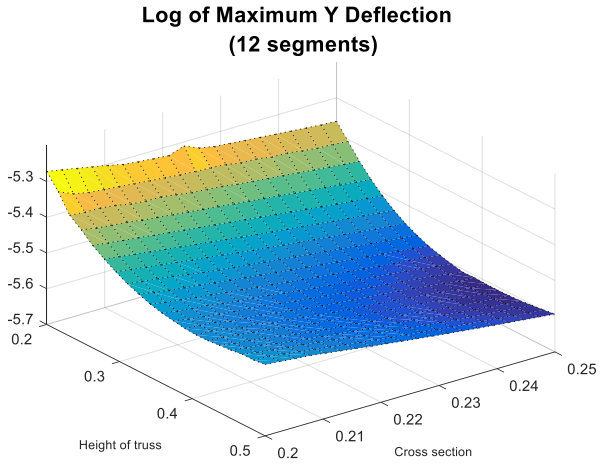


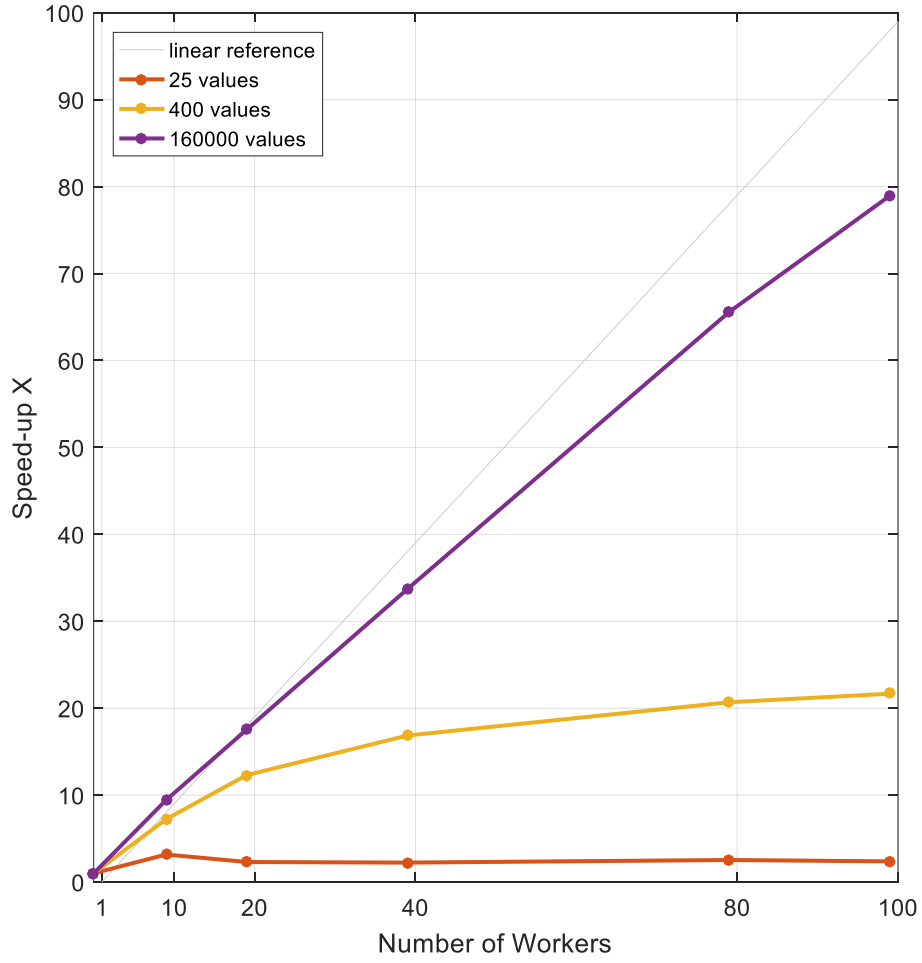
Why parallel computing matters

Scaling case study with a compute cluster

$$M\ddot{x} + C\dot{x} + Kx = F$$



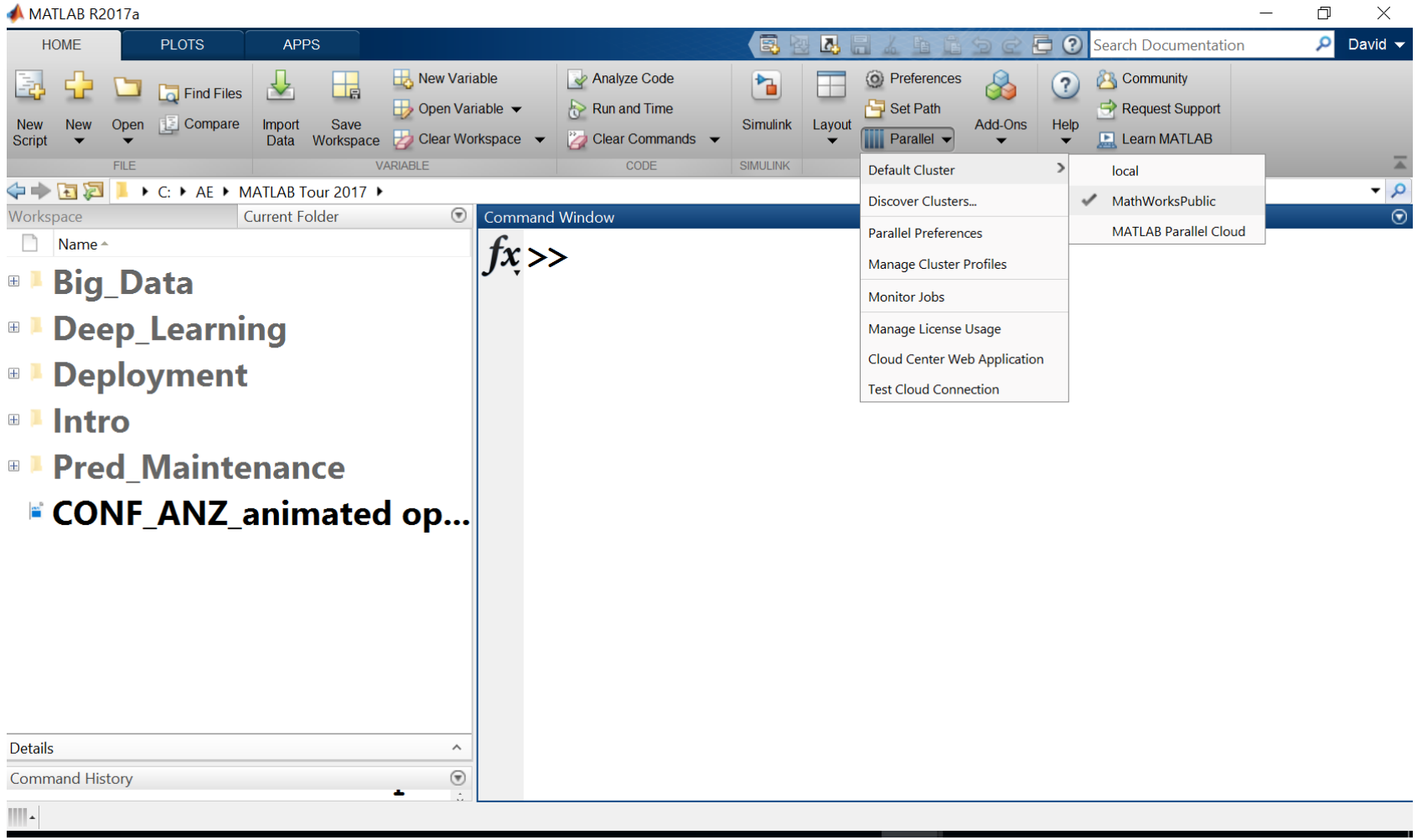




Workers in pool	Compute time (minutes)		
	160e3 values	400 values	25 values
1	140	0.38	0.03
10	15	0.05	0.01
20	8.0	0.03	0.01
40	4.2	0.02	0.01
80	2.1	0.02	0.01
100	1.8	0.02	0.01

Processor: Intel Xeon E5-class v2
16 physical cores per node
MATLAB R2016a

Example – Connecting to a 256 node cluster

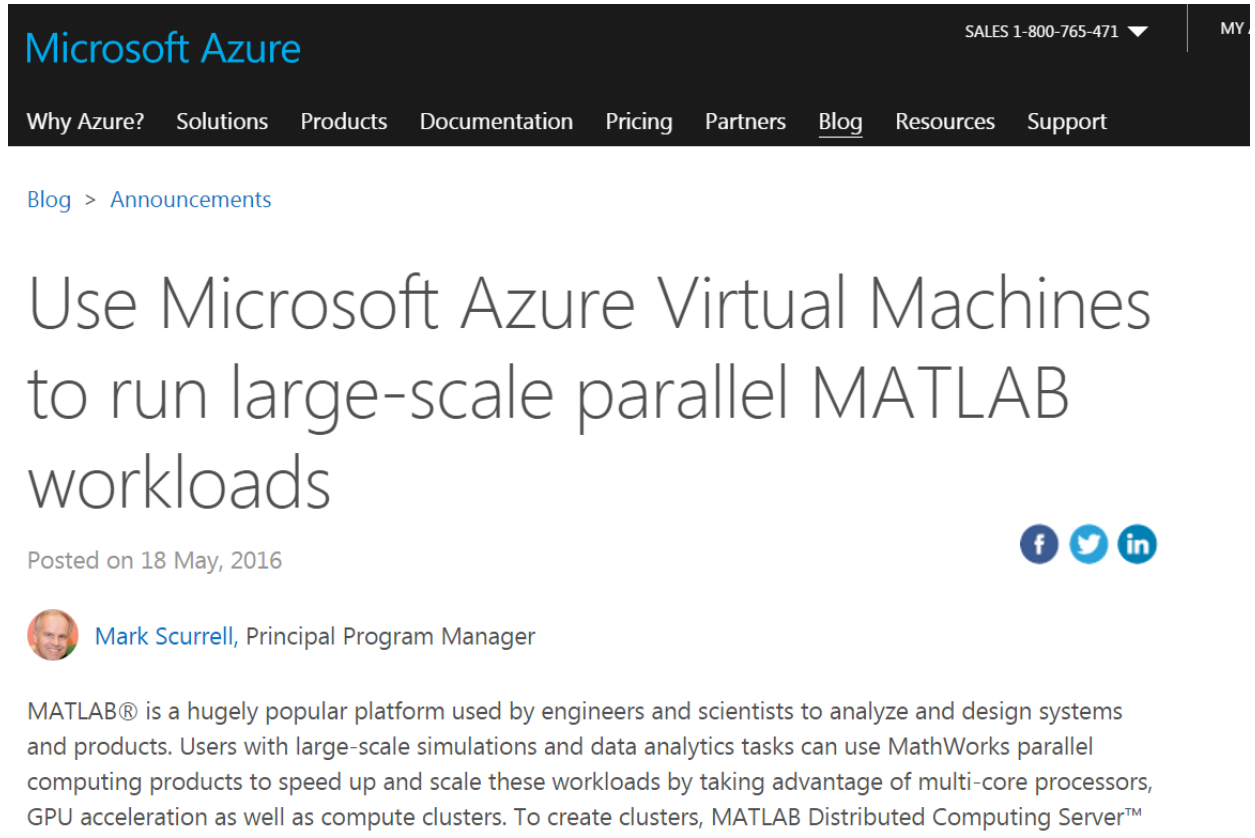


MATLAB HPC on Azure
using MATLAB Distributed Computing Server

*"Running **MATLAB Distributed Computing Server** on a cluster of Azure VMs provides user-friendly, high performance computing at very low cost compared to the total cost of ownership of providing an equivalent MDCS capability on on-premises servers deployed in our own data centres."*

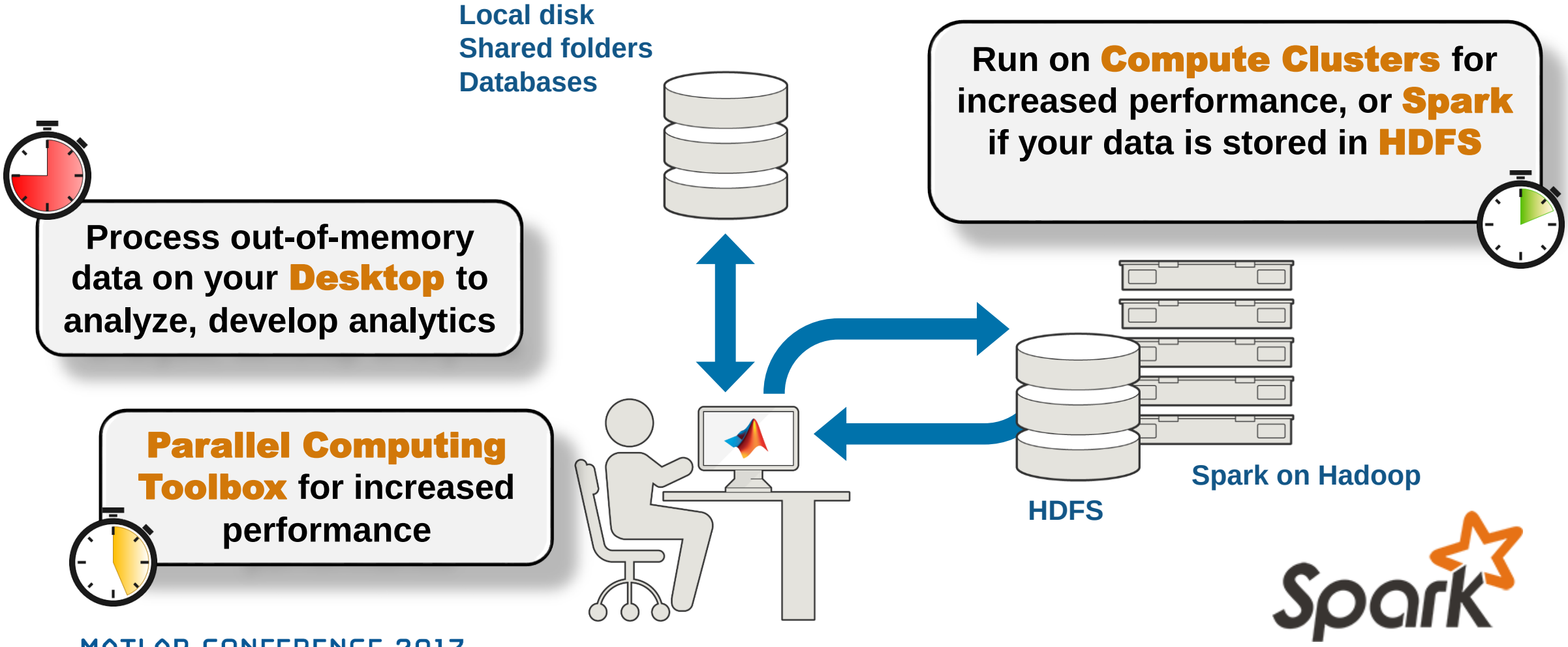
James Mann
Solution Architect
Aberdeen Asset Management PLC

- Story here



MATLAB executing in Spark on Hadoop

Local disk
Shared folders
Databases



Process out-of-memory data on your **Desktop** to analyze, develop analytics

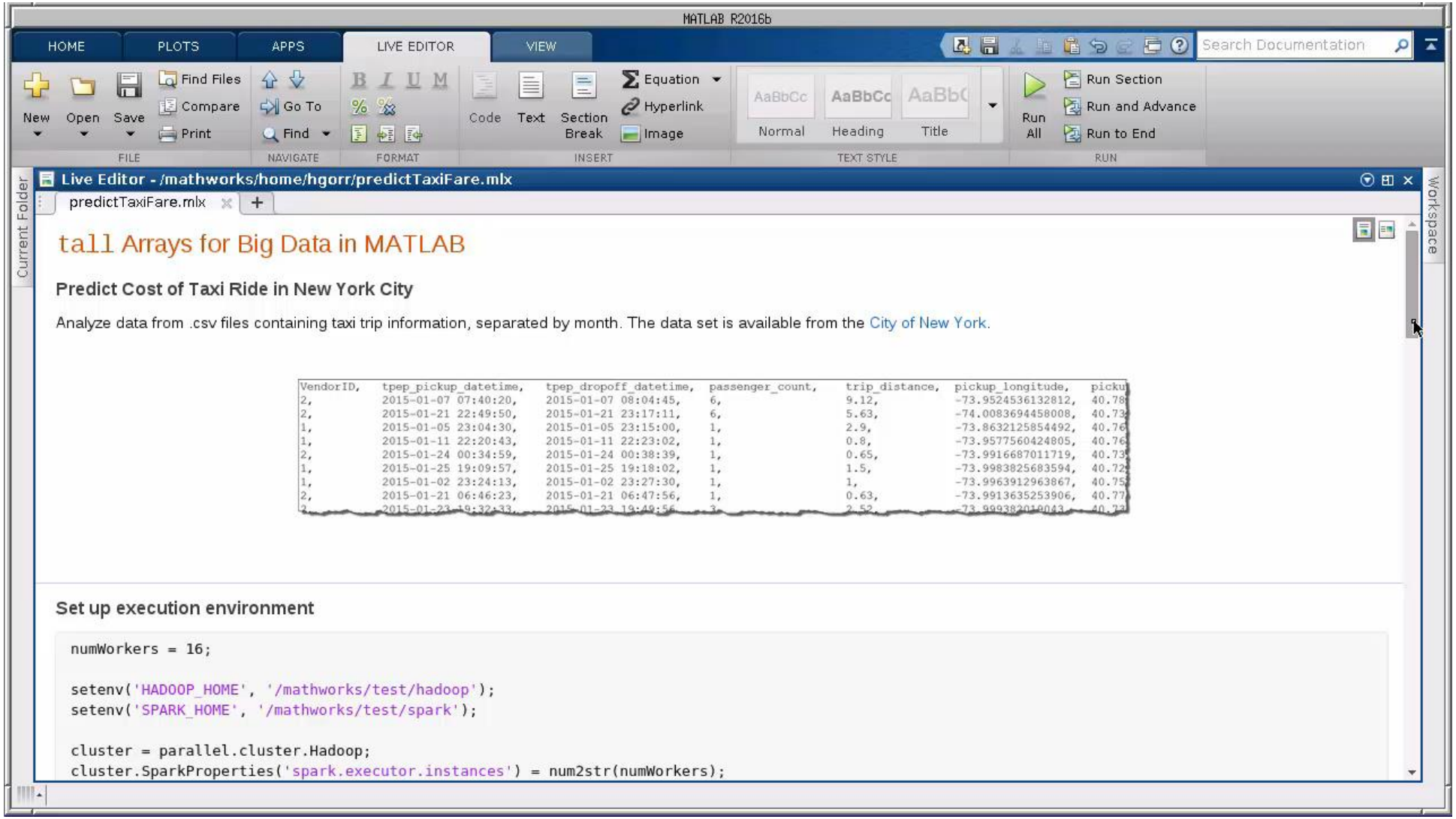
Run on **Compute Clusters** for increased performance, or **Spark** if your data is stored in **HDFS**

Parallel Computing Toolbox for increased performance

HDFS

Spark on Hadoop

Example: Running on Spark and Hadoop



Key Takeaways

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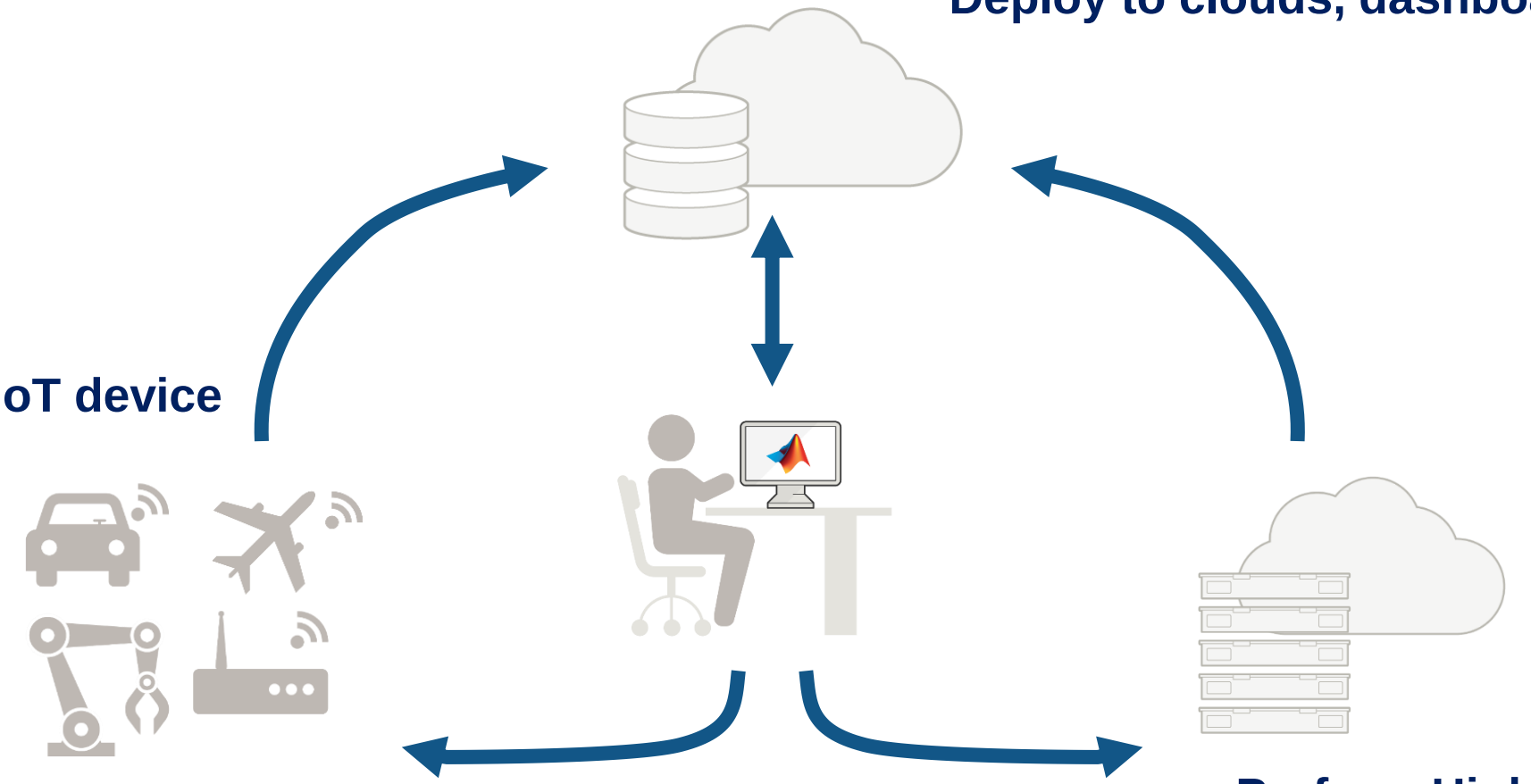
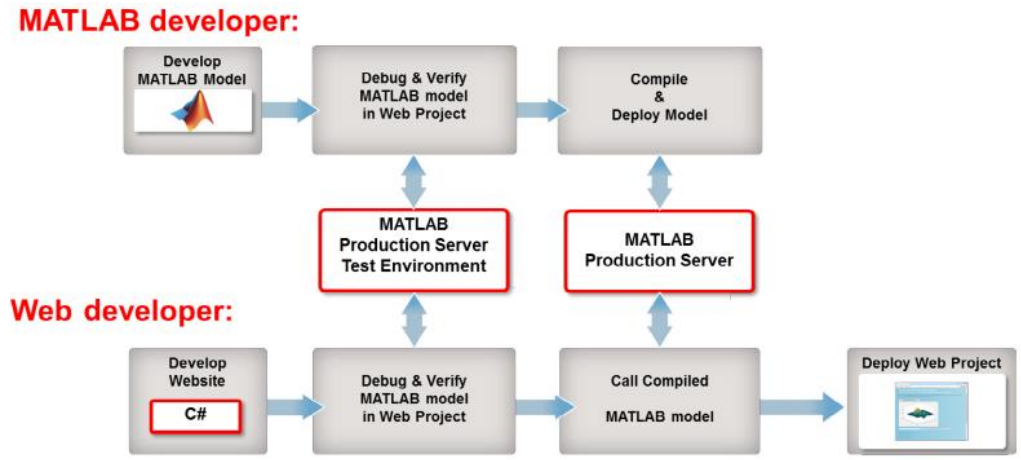
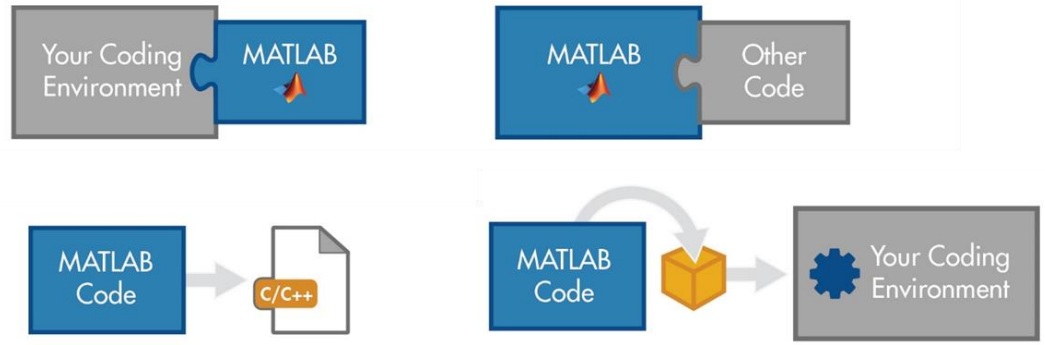
Key Take Away
MATLAB Streamlines Enterprise Integration

Deploy to clouds, dashboards



Deploy to an IoT device

Perform High Performance Computing (HPC)

Online Resources

- Documentation – Create and Share Toolboxes
- Website – Desktop and Web Deployment
- Free White Paper – Building a Website with MATLAB Analytics
- Website – Using MATLAB With Other Programming Languages