MATLAB EXPO 2017
Integrate MATLAB Analytics into Enterprise Applications

Ionut Barbu, Application Engineer
Data Analytics Workflow

Access and Explore Data

Preprocess Data

Develop Predictive Models

Integrate Analytics with Systems

Business Data

Sensor Data

Data Reduction/Transformation

Feature Extraction

Model Creation

Model Validation

Enterprise Systems

Embedded Devices

MATLAB: Single Platform
Data Analytics Workflow

Access and Explore Data

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Develop Predictive Models

Model Creation

Model Validation

Integrate Analytics with Systems

MATLAB: Single Platform
Challenges

- Bridge the gap between multiple disciplines

- Integrate solutions to enterprise scale frameworks

- Deliver fast results with large volumes of data
Different tools for development and productization

- Application
- Manual translation
- Enterprise solution

Domain Expert

Solution Architect
What if you speed up the integration process?

with automatic deployment
Sharing and Deploying MATLAB Applications
Write Your Programs Once, Then Share to Different Targets

MATLAB

With MATLAB Users

With People Who Do Not Have MATLAB

MATLAB Compilers

Coders

MATLAB Runtime
Share with People Who Do Not Have MATLAB

Share Applications with No Additional Programming
- Standalone Application
- Excel Add-in
- Hadoop, Spark
- C/C++ shared library
- Java
- .NET
- Python
- MATLAB Runtime
- MATLAB Compiler
- MATLAB Production Server

Integrate MATLAB-based Components With Your Own Software
- MATLAB Compiler SDK
- Python
- .NET
- Java
- C/C++ shared library
- Hadoop, Spark
- Excel Add-in
- Standalone Application

• Royalty-free Sharing
• IP Protection via Encryption

• MATLAB Compiler
• MATLAB Production Server
• MATLAB Runtime
Integrate MATLAB-based Components With Your Own Software
Using MATLAB Compiler SDK to create Java Classes
Using MATLAB Compiler SDK to create Java Classes
MATLAB and MATLAB Production Server is the easiest and most productive environment to take your enterprise analytics or Internet of Things solution from idea to production.
Energy Load Forecast
Energy Load Forecast

MATLAB Desktop
- Train in MATLAB

MATLAB Runtime
- LIBRARY

Web Application Server
- Apache Tomcat
- Web Server/Webservice

Predictive Models
- Energy Data
- Weather Data
Energy Load Forecast

MATLAB Desktop
- Train in MATLAB

MATLAB Runtime
- Predictive Models
- Library
- Energy Data
- Weather Data

Web Application Server
- Apache Tomcat
- Web Server/Webservice

Multiple users
Energy Load Forecast

MATLAB Desktop
Train in MATLAB

MATLAB Production Server
MATLAB Production Server
Request Broker
LIBRARY

Web Application Server
Apache Tomcat
Web Server/Webservice

Predictive Models

Energy Data
Weather Data
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)
Manage Your Server Instances Using a Dashboard Interface
Manage Your Server Instances Using a Dashboard Interface
Building Automation IoT Analytics on Azure

Building/HVAC automation control system
- Variety of sensors and controls
- Networked communication
- Data reduction

Global heavy duty electrical equipment manufacturer

Business Systems

Users

Algorithm Developers

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Technology Stack

Databases
- neo4j
- MongoDB
- SQL Server
- Azure Blob
- S3

Cloud Storage

IoT

Data

Analytics

MATLAB Distributed Computing Server

MATLAB Production Server

Request Broker

Business System

Visualization

Qlik

Web

Custom App

Microsoft IIS

Spotfire

WebSphere

Apache Tomcat

Python

C

Public Cloud

Private Cloud

Platform

Microsoft Azure

Amazon Web Services

OpenStack

VMware
Front-end Scalability

Application server for MATLAB

- Manage large numbers of requests to run deployed MATLAB programs

Back-end Scalability

Cluster framework for MATLAB

- Speed up computationally intensive programs on computer clusters, clouds, and grids
Parallel Computing Paradigm

Clusters
Speed-up using Multiple Cores on the Cloud
High Resolution Image Processing
Big Data Workflow

Process out-of-memory data on your **Desktop** to explore, analyze, gain insights and to develop analytics.

Use **Parallel Computing Toolbox** for increased performance.

Run on **Compute Clusters** or **Spark + Hadoop (HDFS)**, for large scale analysis.

**Local disk, Shared folders, Databases**

**MATLAB Distributed Computing Server, Spark+Hadoop**
**Scale your Applications Beyond the Desktop**

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Explicit desktop scaling</td>
<td>Single-user, basic scaling to cloud</td>
<td>Scale to EC2 with some customization</td>
<td>Scale to custom cloud</td>
<td>Scale to clusters</td>
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<tr>
<td><strong>Maximum workers</strong></td>
<td>No limit</td>
<td>16</td>
<td>256</td>
<td>No limit</td>
<td>No limit</td>
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<td><strong>Hardware</strong></td>
<td>Desktop</td>
<td>MathWorks Compute Cloud</td>
<td>Amazon EC2</td>
<td>Amazon EC2, Microsoft Azure, Others</td>
<td>Any</td>
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<tr>
<td><strong>Availability</strong></td>
<td>Worldwide</td>
<td>United States and Canada</td>
<td>United States, Canada and other select countries in Europe</td>
<td>Worldwide</td>
<td>Worldwide</td>
</tr>
</tbody>
</table>

Learn More: [Parallel Computing on the Cloud](#)
Customer Example: Financial Customer Advisory Service

- **MATLAB Compiler SDK**
  - **Algorithm Developers**
  - **MATLAB**

**MATLAB Production Server**
- **Request Broker**
- **Request Broker**
- **Request Broker**

- **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

Customer Example: Financial Customer Advisory Service
How to get started?

- Data Analytics
- Application Development
- Code Generation