Modeling & Simulation as a Service (M&SaaS)

NASA Phase II SBIR

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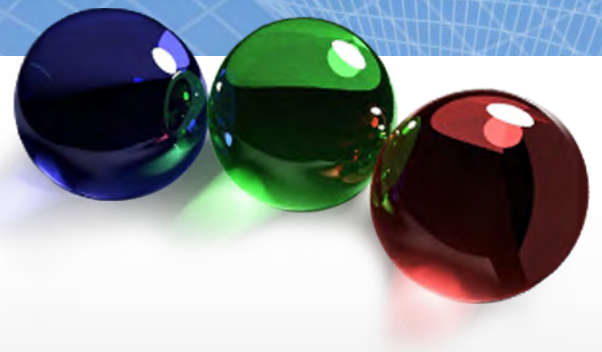

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Corporate Overview

PARABON® COMPUTATION

- **Parabon Computation, Inc.**
  - Founded in 1999
  - Launched Frontier® in 2000, making it the first commercial (COTS) grid solution
  - Operates the only brokered computation service
  - Deploys Frontier Enterprise for secure private grids
  - Has customers in the government, academic, non-profit and private sectors
  - Is a privately-held business in Reston, VA

Overview

- Primary Objective and Benefit
- Key M&SaaS Concepts
- M&SaaS Architecture
- M&SaaS Video
- Q&A

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Primary Objective & Benefit

- **Objective**: Enable most modeling and simulation (M&S) activities – from code development and compilation to runtime execution and post-run analysis and collaboration – to be performed from a standard web browser and powered by cloud- and grid-enabled computing resources.

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Primary Objective & Benefit

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"Google Docs++ for M&S"

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Primary Objective & Benefit

- **Objective**: Enable most modeling and simulation (M&S) activities – from code development and compilation to runtime execution and post-run analysis and collaboration – to be performed from a standard web browser and powered by cloud- and grid-enabled computing resources.
- **Benefit**: Allow M&S users and developers alike to avoid many of the obstacles that currently confound the delivery, accessibility and usability of traditional, non-service-oriented ("tarball") software applications, particularly models and simulations.

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M&SaaS Concepts

- Everything is Service-Oriented
  - **Software as a Service (SaaS)**
    Delivery model
    - Browser-based access to software
  - **Platform as a Service (PaaS)**
    Development environment
    - Browser-based development
  - **Infrastructure as a Service (IaaS)**
    Operational environment
    - Grid-based access to resources

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M&SaaS Concepts

- Members coalesce around a code **project**
- Projects consist of:
  - Applications
  - Actors & Roles
  - Tools
  - Libraries
  - Documentation
  - Releases
  - Build Environments
  - Forums / Wikis
  - Application variants
  - Sample Input Data
  - Reference Data
  - Results
  - Repositories / SCM
  - Execution Environments

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M&SaaS Concepts

- A **division of labor** exists among **actors**
  - Core Developer
  - Domain Programmer
  - QA Tester
  - End User
- Actors form **code-centric communities**

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Code-Centric Community: Actors

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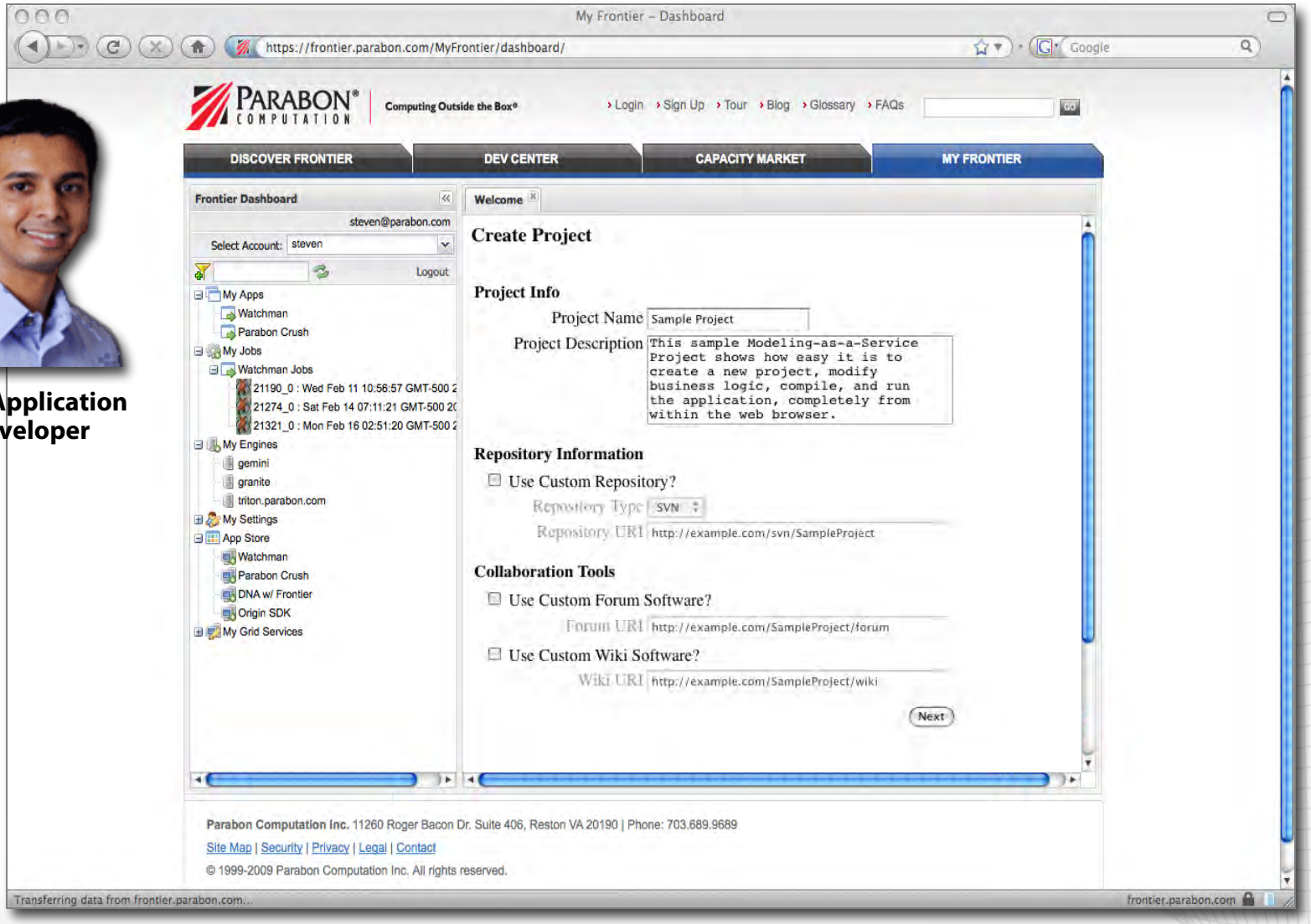
Code-Centric Community: Actors

Core Application Developer



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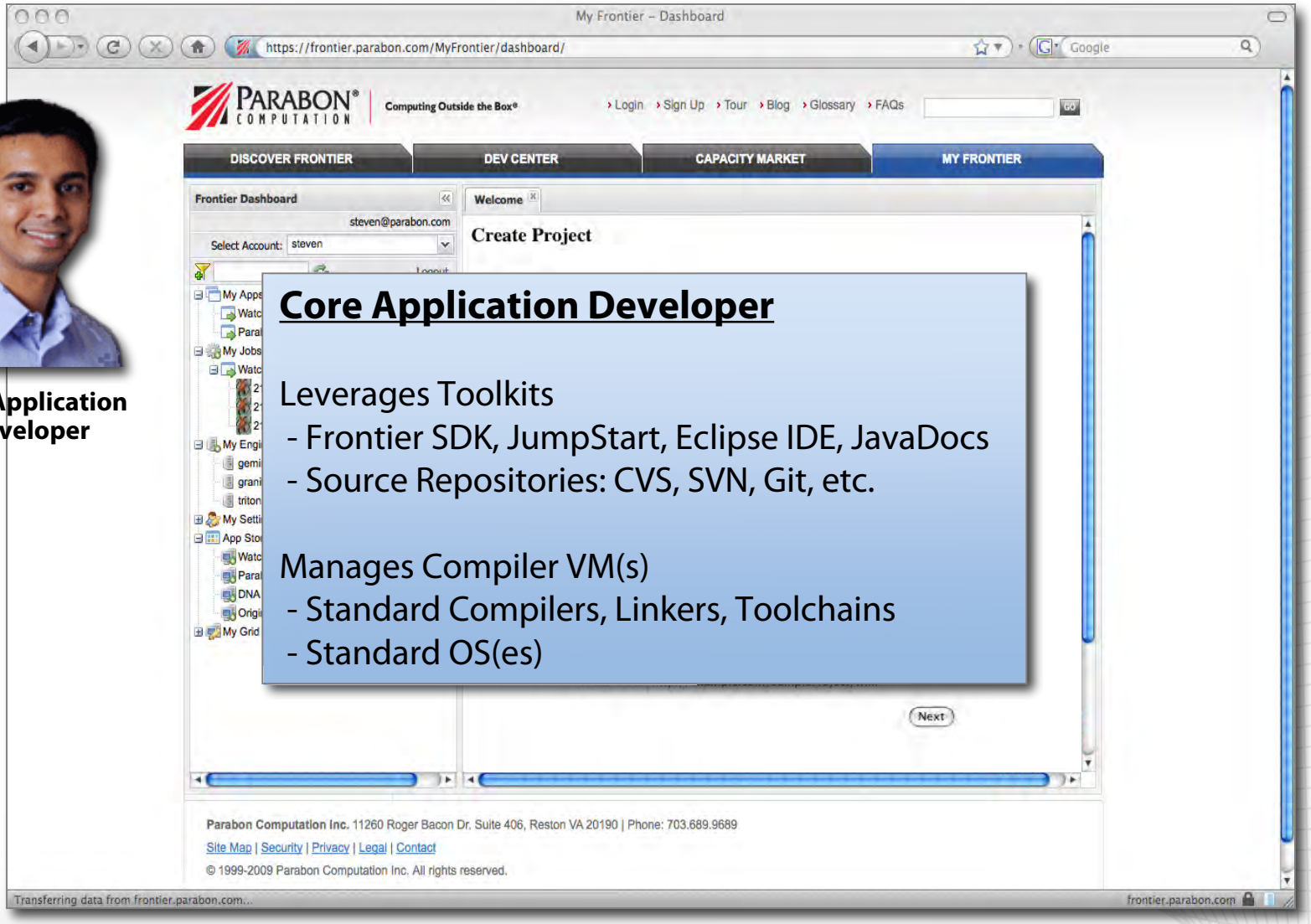
Code-Centric Community: Actors

Core Application Developer



Core Application Developer

Leverages Toolkits
- Frontier SDK, JumpStart, Eclipse IDE, JavaDocs
- Source Repositories: CVS, SVN, Git, etc.

Manages Compiler VM(s)
- Standard Compilers, Linkers, Toolchains
- Standard OS(es)

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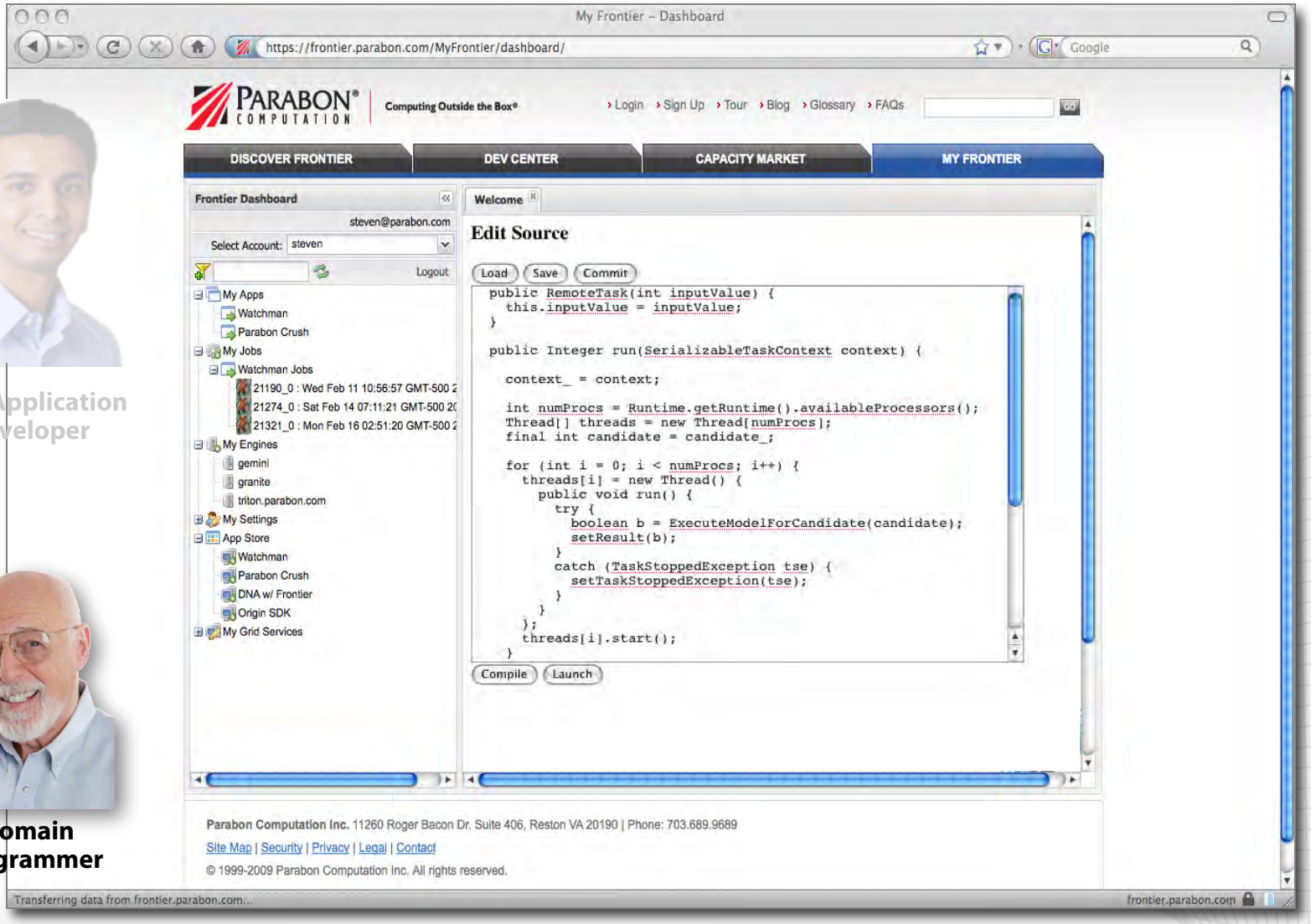
Code-Centric Community: Actors

Core Application Developer

Domain Programmer



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Code-Centric Community: Actors

Core Application Developer

Domain Programmer

Domain Programmer

Tweaks Science/Business Application Logic
- Programs in Fortran, R, Scheme, etc.
- Uses Integrated Text Editor
- Creates Branches and/or Variants
- Builds against Standard Compile VMs
- Collaborates via Forums and/or Wikis

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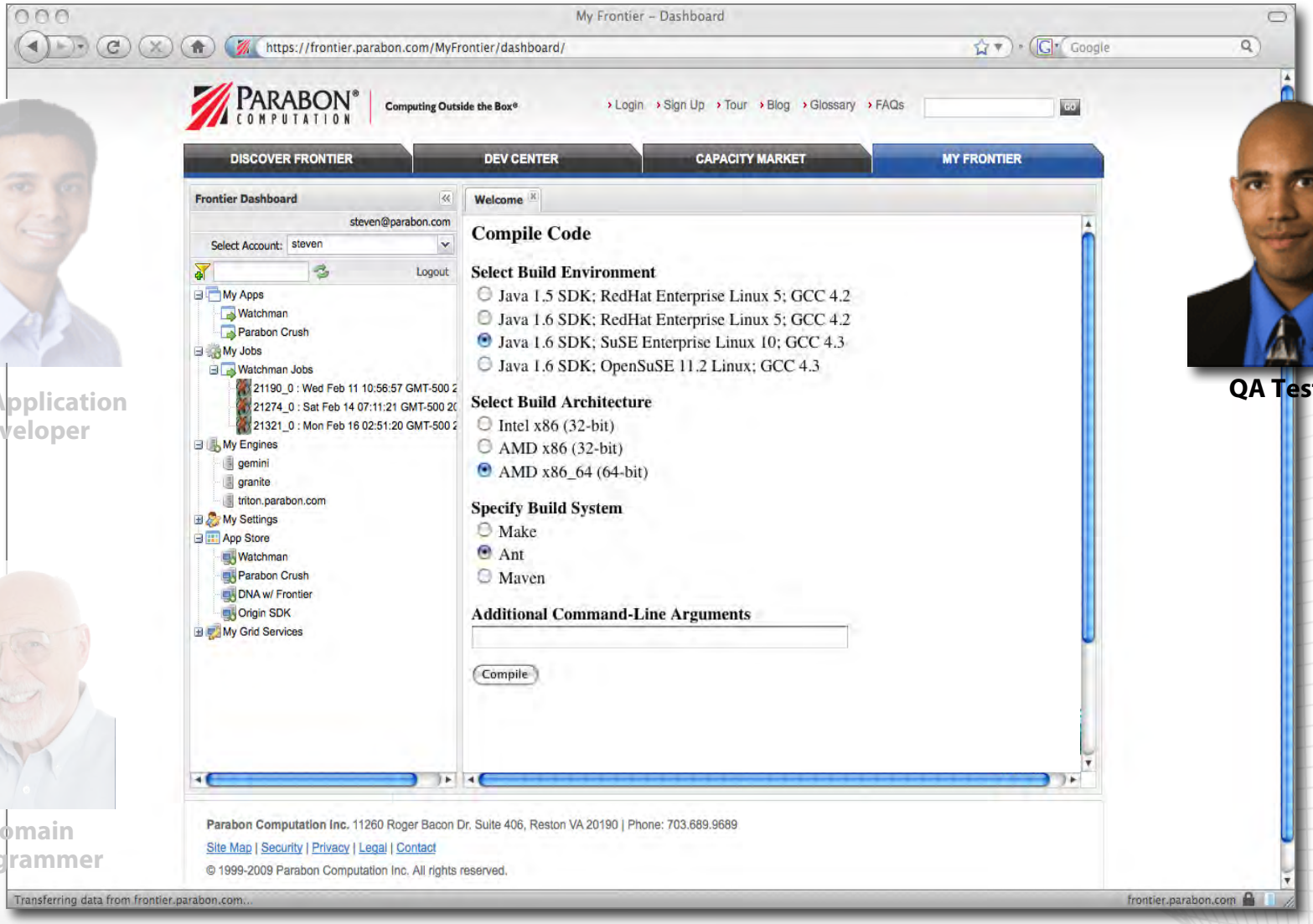
Code-Centric Community: Actors

Core Application Developer

Domain Programmer



QA Tester

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Code-Centric Community: Actors

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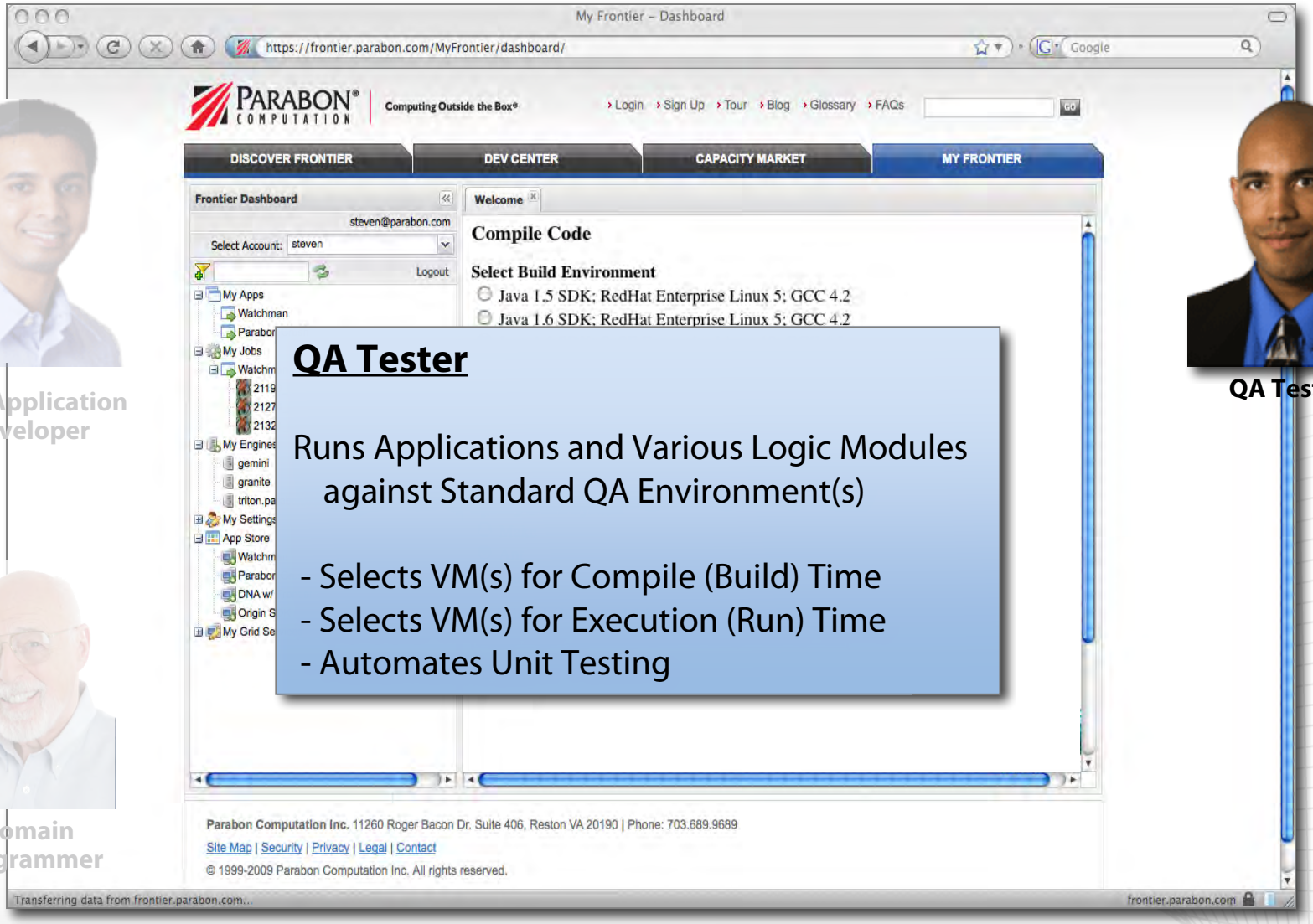
Domain Programmer



QA Tester

Runs Applications and Various Logic Modules against Standard QA Environment(s)

- Selects VM(s) for Compile (Build) Time
- Selects VM(s) for Execution (Run) Time
- Automates Unit Testing

QA Tester

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Code-Centric Community: Actors

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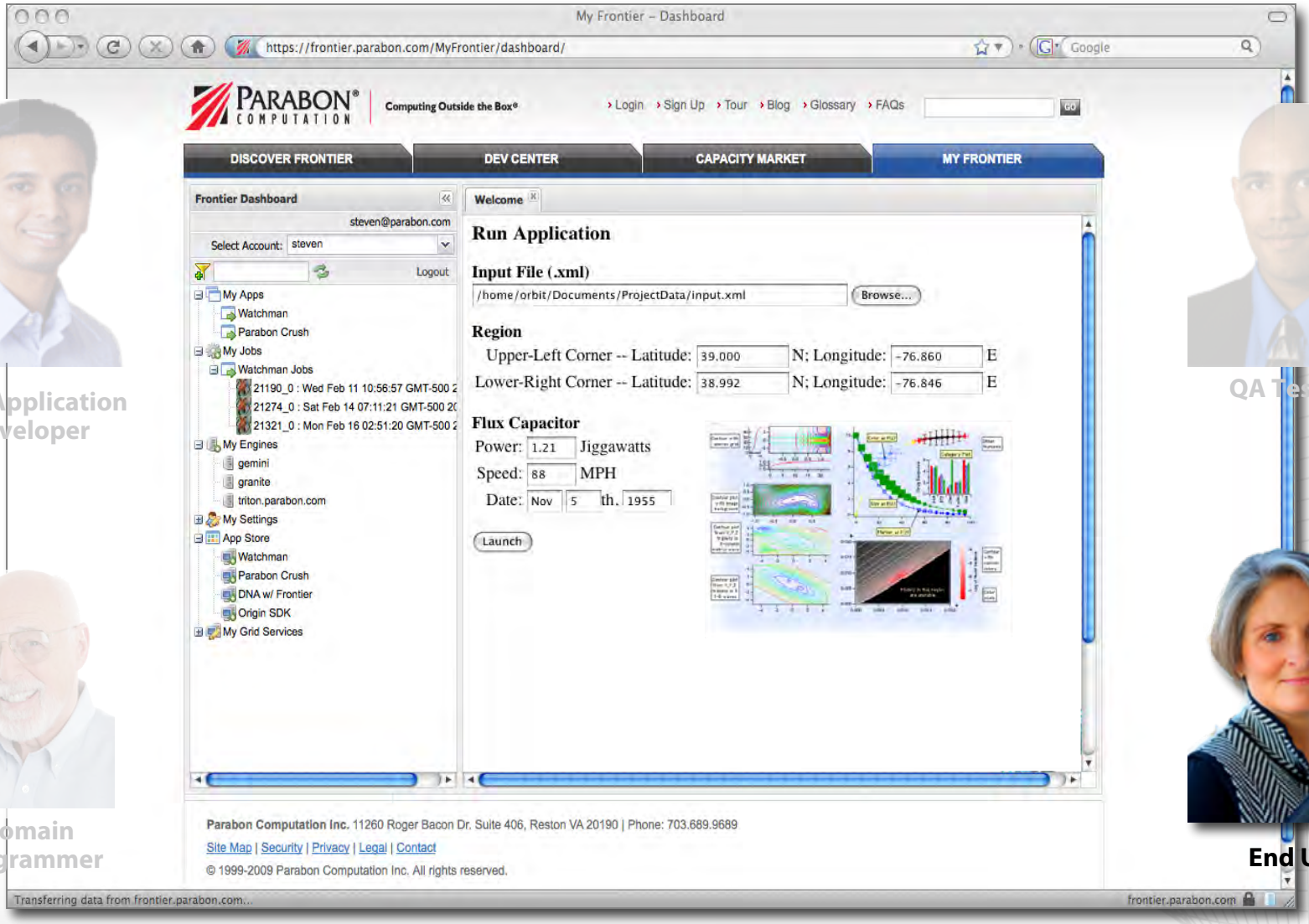
Domain Programmer



QA Tester

End User

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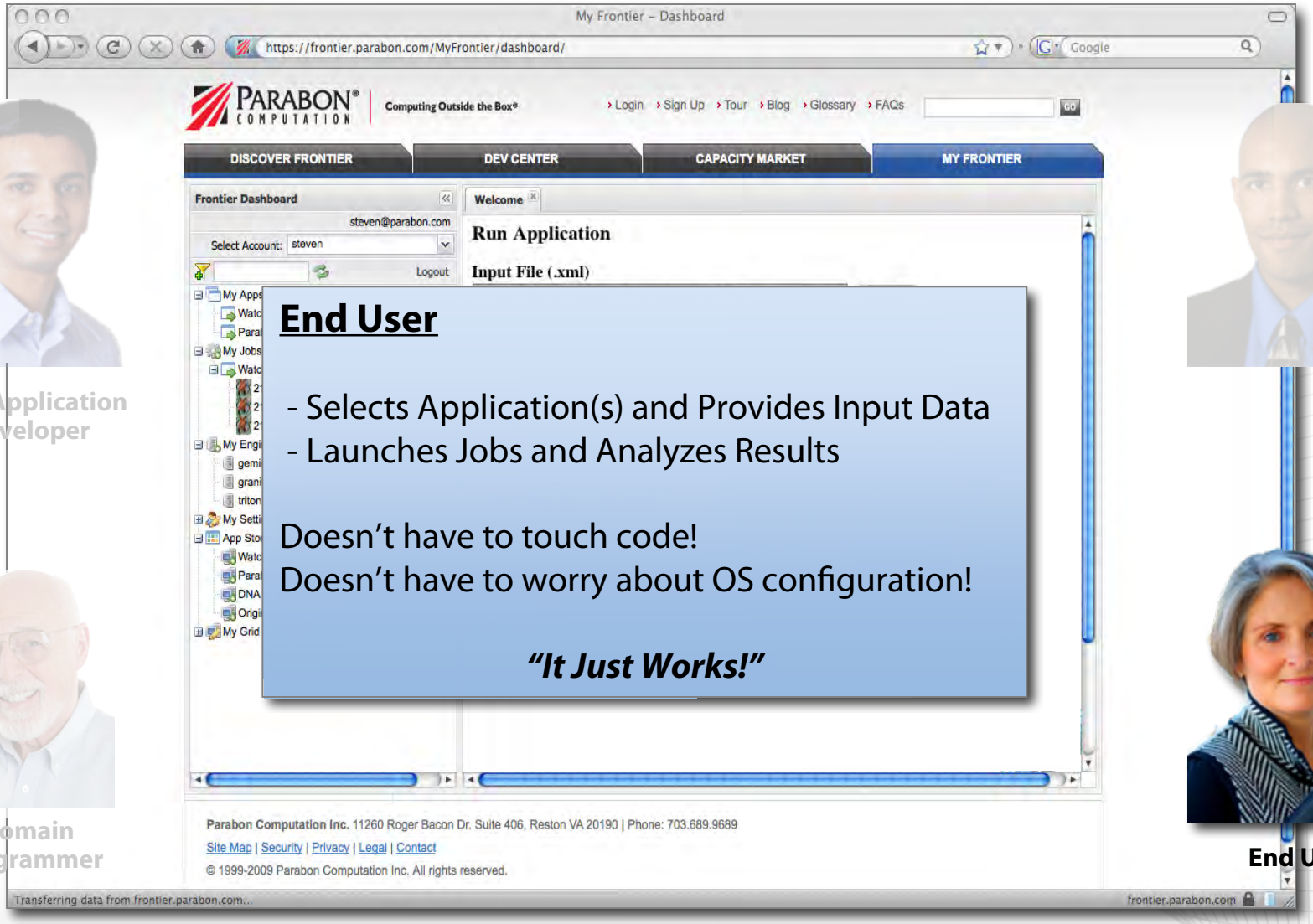
Code-Centric Community: Actors

Core Application Developer

Domain Programmer



End User

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Code-Centric Community: Actors

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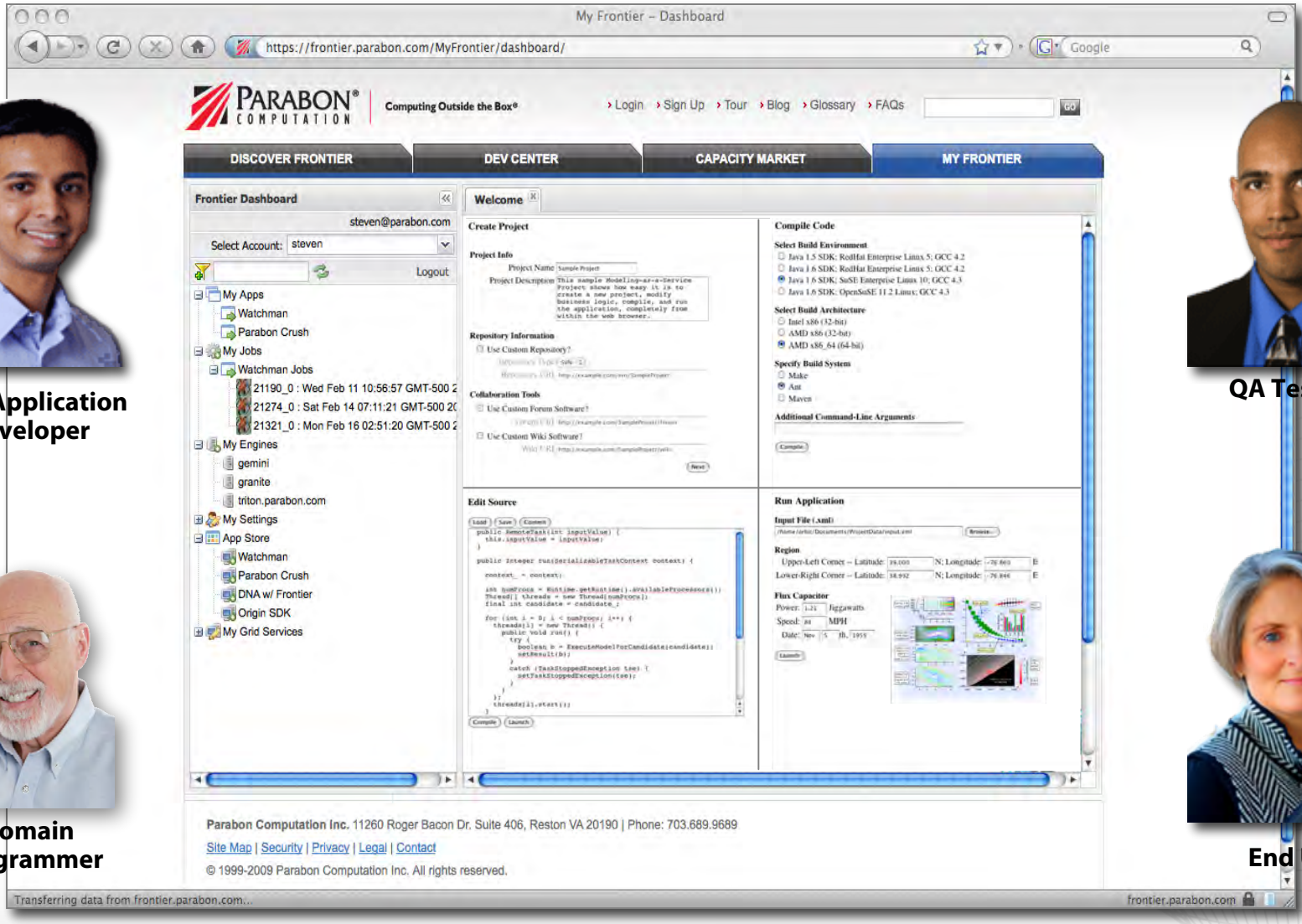

QA Tester

End User

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Code-Centric Community: Actors

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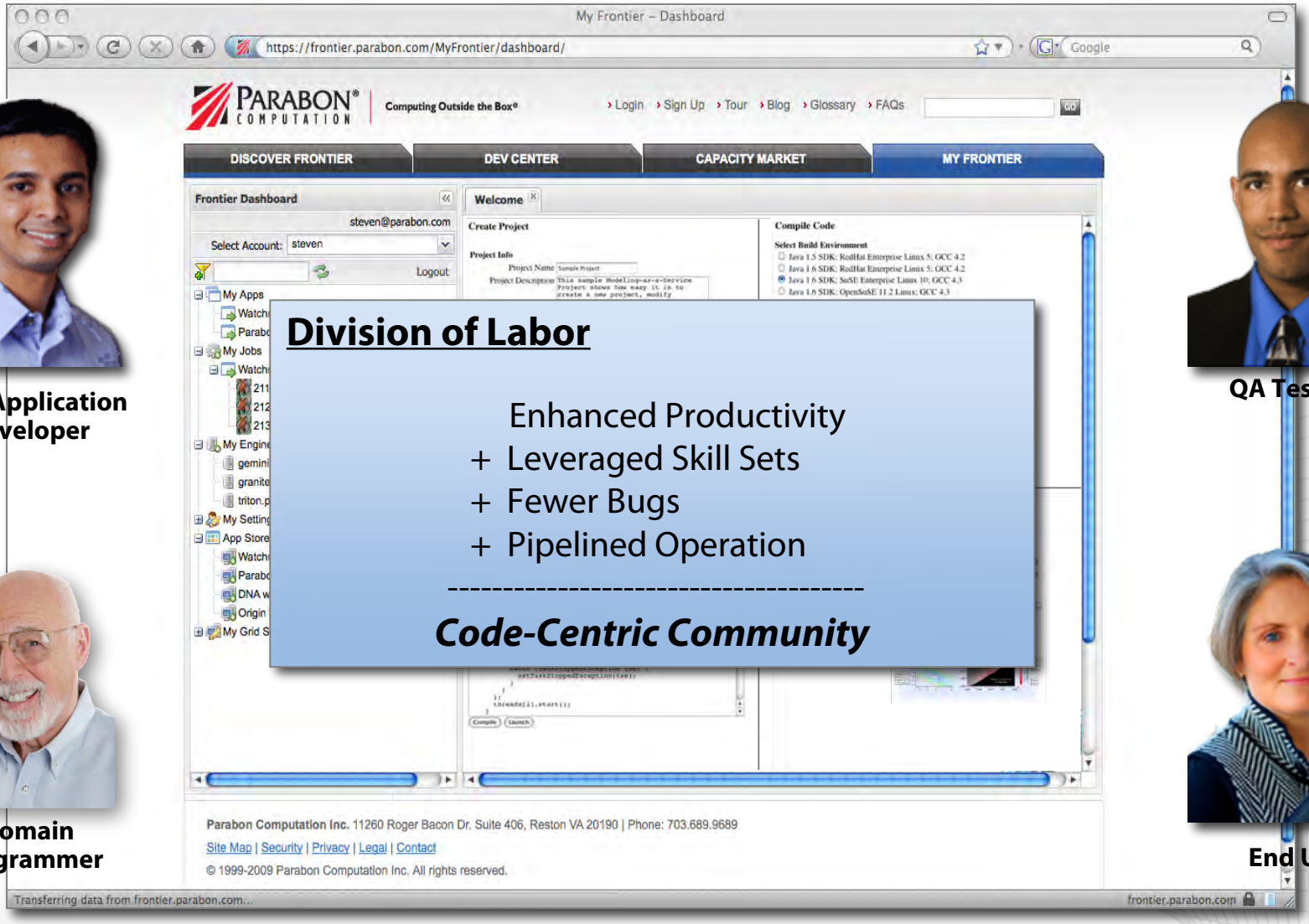

QA Tester

End User

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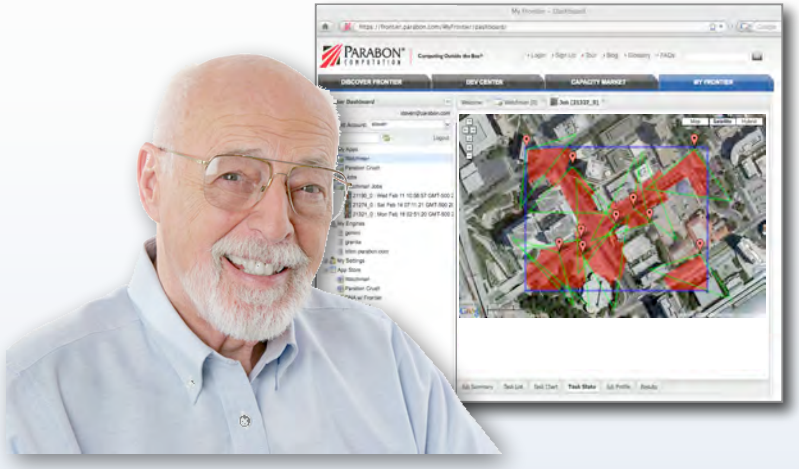
Parabon's Frontier® Grid Platform

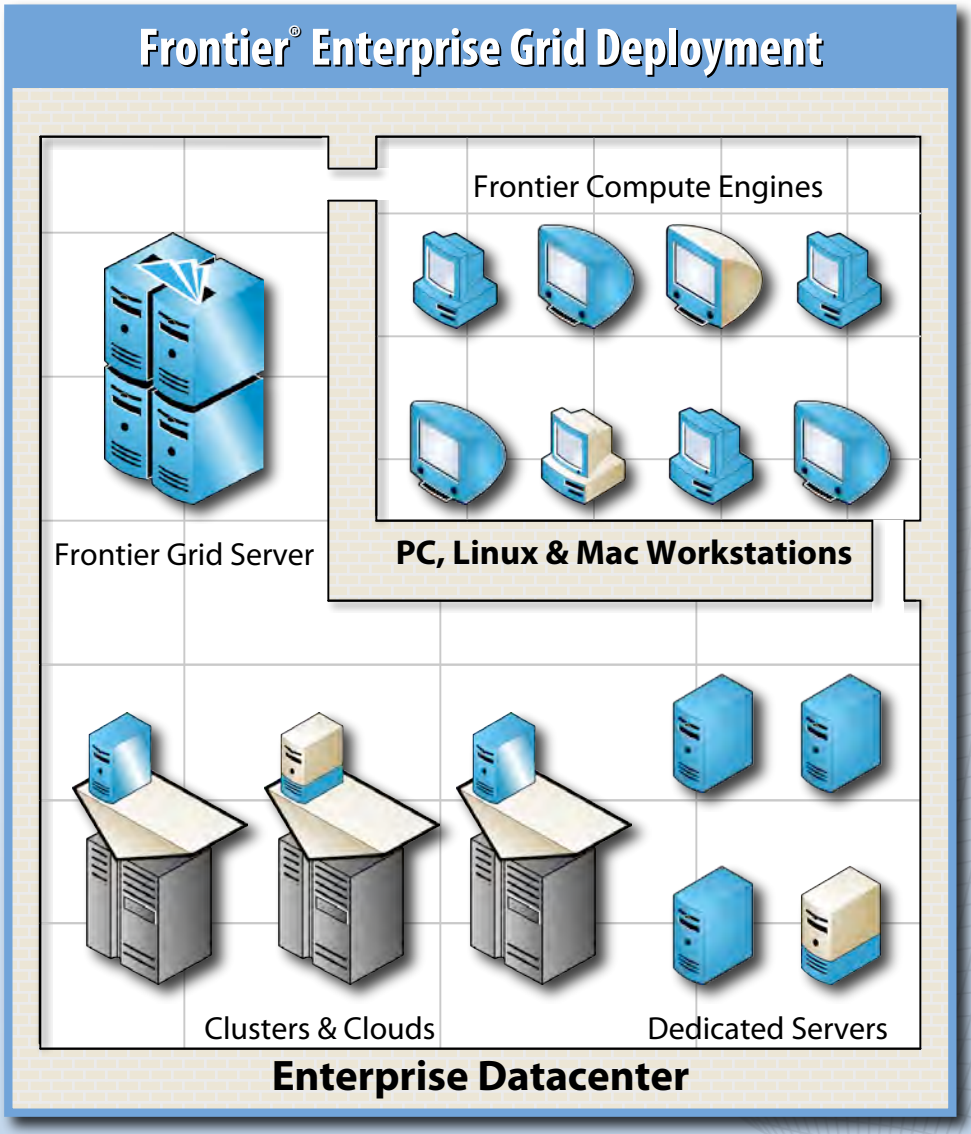


Parabon's **Frontier® Grid Platform** is a turn-key, commercial off-the-shelf (COTS) software solution that unobtrusively harnesses unused and/or dedicated computing capacity across enterprise network(s) – allowing you to securely:

✓ **Maximize ROI of existing enterprise assets**
- Use available resources more efficiently
- ***Avoid costly hardware expenditures!***

✓ **Solve previously intractable problems**
- Launch ***data-heavy*** and ***compute-intensive*** jobs
- Manage ***distributed command & control*** apps
- Host ***cloud computing*** web services

✓ **Reduce current processing times**
- From decades to days, or months to minutes



Service Layer Stack

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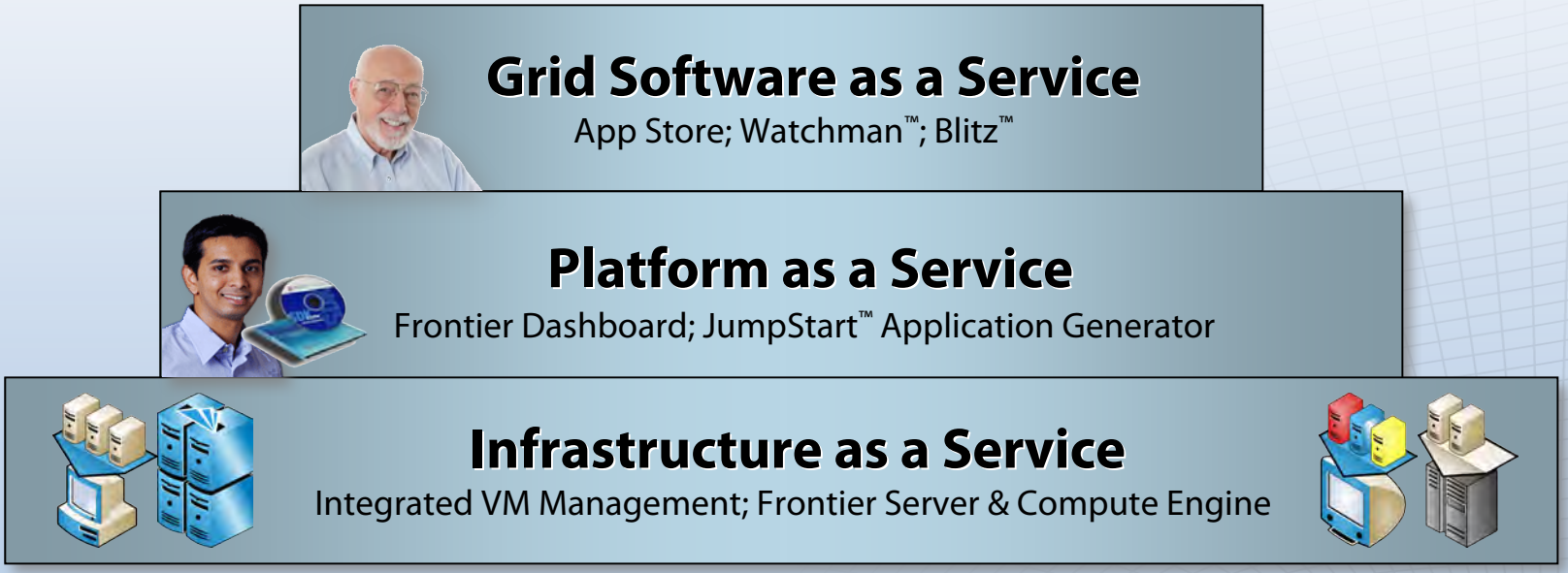
Frontier's complete service stack provides
Infrastructure, Platform, and Grid Software as a Service layers



Service Layer Stack

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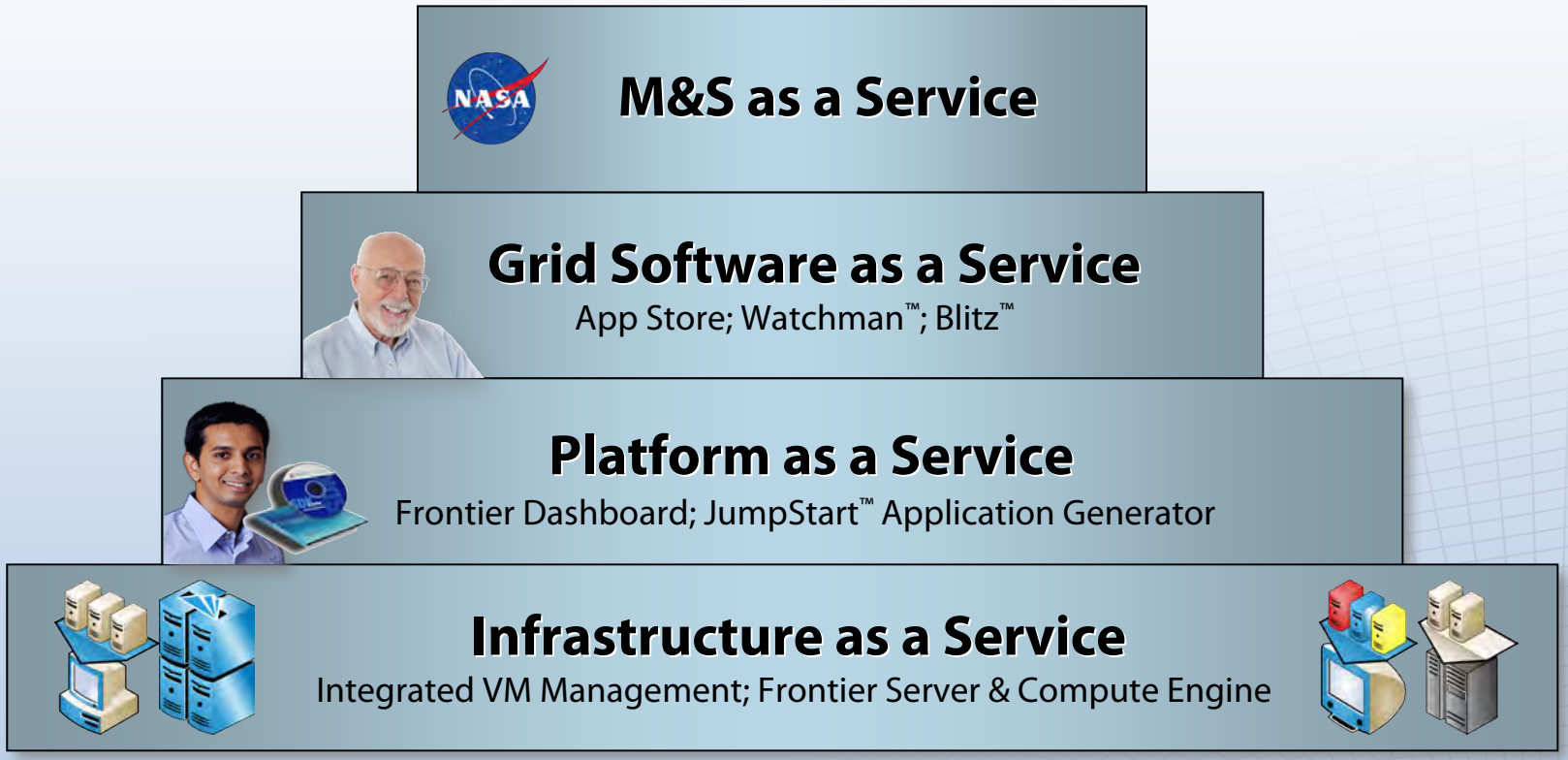
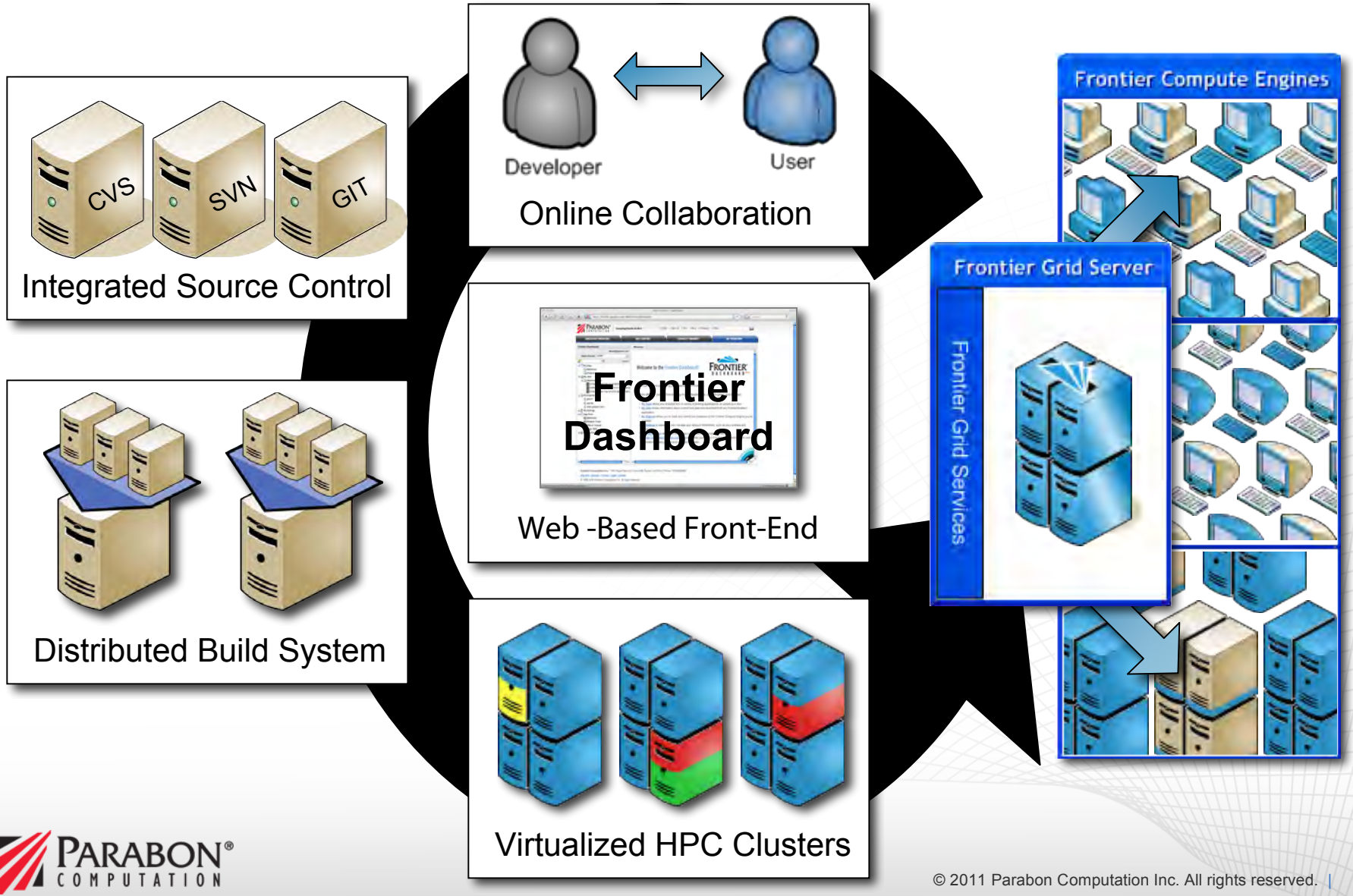
M&SaaS builds upon these service layers to provide a new generation of M&S capabilities



M&SaaS: Architecture



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M&SaaS Video

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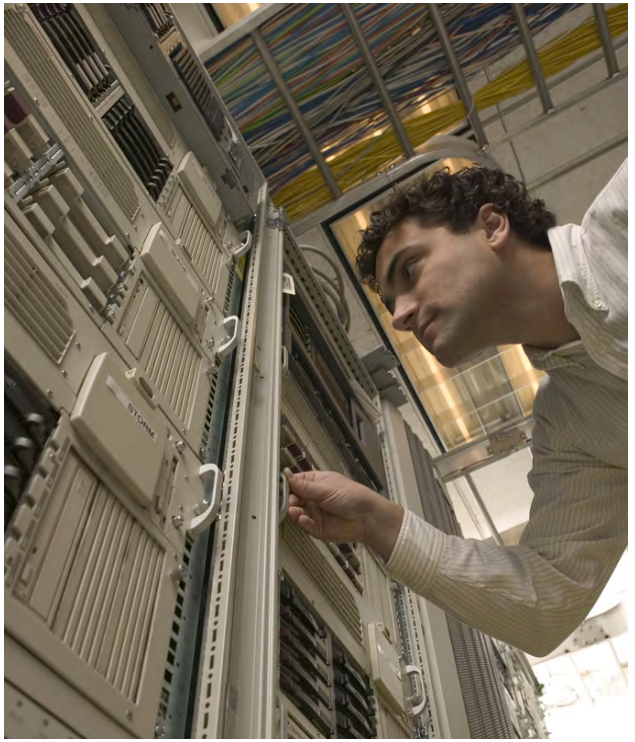
Questions?



For more information contact
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