

The UberCloud

From Project to Product

From HPC Experiment to HPC Marketplace

From HPC Shop to HPC Shopping Mall

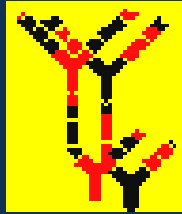
HPC 2014 , Cetraro, July 7 – 11, 2014

Wolfgang Gentzsch

President, The UberCloud

Burak Yenier

CEO, The UberCloud



The UberCloud

From Project to Product

From HPC Experiment to HPC Marketplace

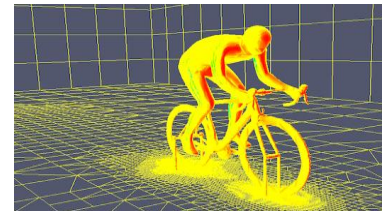
From HPC Shop to HPC Shopping Mall

HPC 2014 , Cetraro, July 7 – 11, 2014

Product innovation and scientific insight **require** computing



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Engineers & scientists computing tools: workstations, servers, and clouds



3 options to use technical compute power





Benefits of HPC in the Cloud

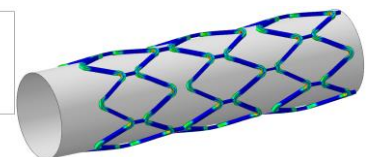
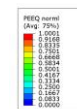
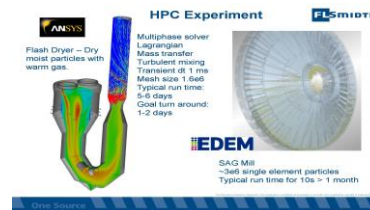
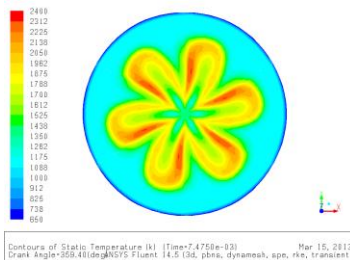
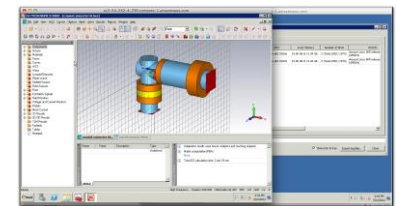
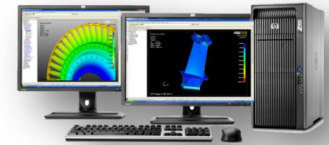
Continue using your workstation for your daily design, and use Cloud resources with **additional** benefits:

- + An HPC system at your finger tip, **on demand**
- + **Pay per use** (no CAPital EXpenditure)
- + **Scaling resources** up and down (business flexibility)
- + **Low risk** by working with multiple cloud providers.



The challenges

- + **Workstation:** slow, limited capacity
- + **HPC server:** expensive (TCO!), complex
- + **HPC in the Cloud:** security, licensing, data transfer, expertise, and ...
- + Very crowded cloud services market, difficult to find **your** ideal service



It all started June 2012 with the free voluntary UberCloud **Experiments**



HPC as a Service, on demand, in a team experiment



For **SMBs** and their engineering applications

to explore the end-to-end **process**

of using **remote** computing resources,

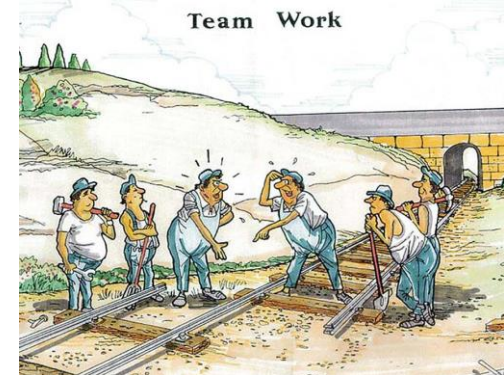
as a **service**, on demand, at your finger tip,

and learning how to resolve the roadblocks.



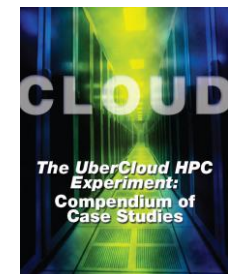
How does the Experiment work?

- + End-User registers
- + Software Vendor joins
- + We select a **Team Expert**
- + Matching a **Resource Provider**



- + Assigning an UberCloud **mentor**
- + Now, the team is **ready to go**
- + Finally, writing the **Case Study**

- + **152 UberCloud Experiments** so far
- + **42 case studies** in Compendium I & II



22 Steps Towards a successful project

Step 1: define end-user project



- + 1.1: TE & EU fill out "Project definition" docu
- + 1.2: UC assigns SP based on "Project definition" docu
- + 1.3: UC + TM assign RP based on "Project definition" docu
- + 1.4: TE calls for a kick-off meeting over Skype via Doodle
- + 1.5: RP fills out "Computing resources" docu
- + 1.6: SP fills out "Software resources" docu
- + 1.7: If custom code, EU fills out "Software resources" docu
- + 1.8 TE + TM review UC Exhibit, consider additional services

EU = end user, SP = software provider, RP = resource provider, TE = team expert,
TM = team mentor, UC UberCloud

22 Steps Towards a successful project

Step 2 & 3: resources & execution



Step 2: Contact the resources, set up the project environment

- + 2.1: TE gets resources using "Computing resources" docu
- + 2.2: TE & RP set up software using "Software resources" docu
- + 2.3: TE & RP set up EU code using "Software resources" docu
- + 2.4: TE & RP configure project environment
- + 2.5: TE performs a trial run

Step 3: Initiate project execution on cloud resources

- + 3.1: TE & EU upload data to the project environment
- + 3.2: TE & RP queue the job(s) for the project

EU = end user, SP = software provider, RP = resource provider, TE = team expert,
TM = team mentor, UC UberCloud

22 Steps Towards a successful project

Step 4-6: monitor, review, report



Step 4: Monitor the project

- + 4.1: TE monitors the job status
- + 4.2: TE & EU re-set parameters between runs as needed
- + 4.3: TE & RP performs post processing, such as remote viz

Step 5: Review your results

- + 5.1: TE makes results available to EU, if needed repeats Step 2-5
- + 5.2: TE & RP remove EU data from project environment

Step 6: Document your findings

- + 6.1: TE initiates docu "Template for UC Experiment Uses Cases"
- + 6.2: TE requests team to contribute to and review the docu

EU = end user, SP = software provider, RP = resource provider, TE = team expert,
TM = team mentor, UC UberCloud



Step by Step process

Basecamp project management platform for each team

Team 404: Simulating life beyond the Internet ☆

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[23 Discussions](#) [24 To-dos](#) [2 Files](#) [6 Text documents](#) [Dates](#)

Discussions



Burak Y. [Welcome to the HPC Experiment BaseCamp page](#) - Please start by reading the "How to get Started with BaseCamp" text document below.

To-do lists

Step 1. Define the end-user project by completing the following to-do's

- ☐ 1.1 Team Expert fills out "Project definition" text document with support from End User
- ☐ 1.2 Organizer assigns Software Provider based on "Project definition" text document
- ☐ 1.3 Organizer assigns Resource Provider based on "Project definition" text document
- ☐ 1.4 Team Expert calls for a kick-off meeting over Skype via Doodle event scheduler



How to get started?

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Key contacts

Saved 4 minutes ago by Burak Yenier



Project definition

Saved 4 minutes ago by Burak Yenier

The UberCloud HPC Experiments

Started July 2012, 2000 participants, 72 countries



Example: Amazon AWS in the UberCloud:

- + Team 2: Simulation of a Multi-resonant Antenna System
- + Team 20: Turbo-machinery Application Benchmarks
- + Team 30: Heat Transfer Use Case
- + Team 40: Simulation of Spatial Hearing
- + Team 65: Weather Research with WRF
- + Team 70: Next Generation Sequencing Data Analysis
- + Team 116: Quantitative Finance Historical Data Modeling
- + Team 142: Virtual Testing of Severe Service Control Valve
- + Team 147: Compressor Map Generation Using Cloud-Based CFD



Team 2: Simulating new probe design for a medical device



HPC Expert:
Chris Dagdigian

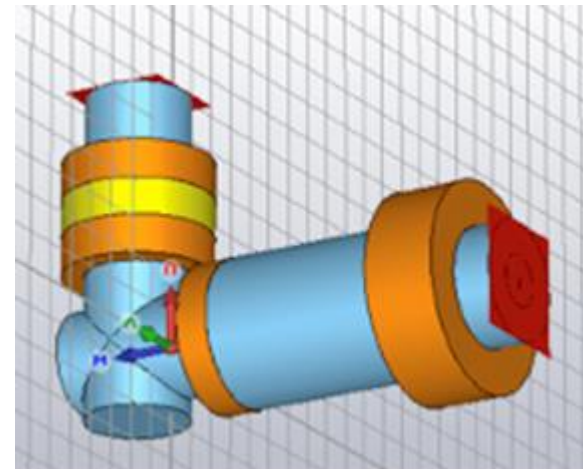


Co-founder and Principal Consultant

BioTeam Inc

Credits
from:  **amazon**
web services™

End User:
wanted to stay anonymous



Team 70 Case Study: Next Generation Sequencing Data Analysis



+ MEET TEAM 70:



- + **End User** - Thomas Dyar, Senior Genomics Data Scientist, Betty Diegel, Senior Software Engineer, medical devices company
- + **Software Provider** - Brian O'Connor, CEO Nimbus Inform... Cloud services for workflows utilizing SeqWare
- + **Resource Provider** - Amazon Web Services
- + **HPC Cloud Experts** - Cycle Computing



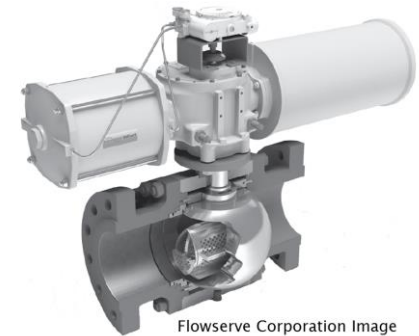
Team 142 Case Study: Virtual testing of severe service control valve



+ **MEET TEAM 142:**



+ **End User** – Mark Lobo, Lobo Engineering;

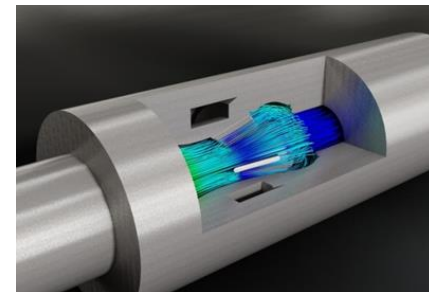


+ **Software Provider** – Derrek Cooper, Autodesk CFD 360

+ **Resource Provider** - Amazon Web Services



+ **HPC Cloud Experts** – Jon den Hartog and Heath Houghton Autodesk





Challenges with the experiments

- + **HPC is complex**; at times it requires multiple experts
- + Reaching out to industry **end-users**
- + **No standards**: access and usage of hw & sw providers are different, some are complex
- + Lack of automation: Currently the end-to-end process of the HPC experiment is manual (intentionally).
- + **Time delays**: vacation, conferences, and everybody has a day job (busy!)
- + **Barriers**: Complexity, data transfer, security, IP, software licenses, performance, interoperability...



AND: we learn a lot

Bumps on the road

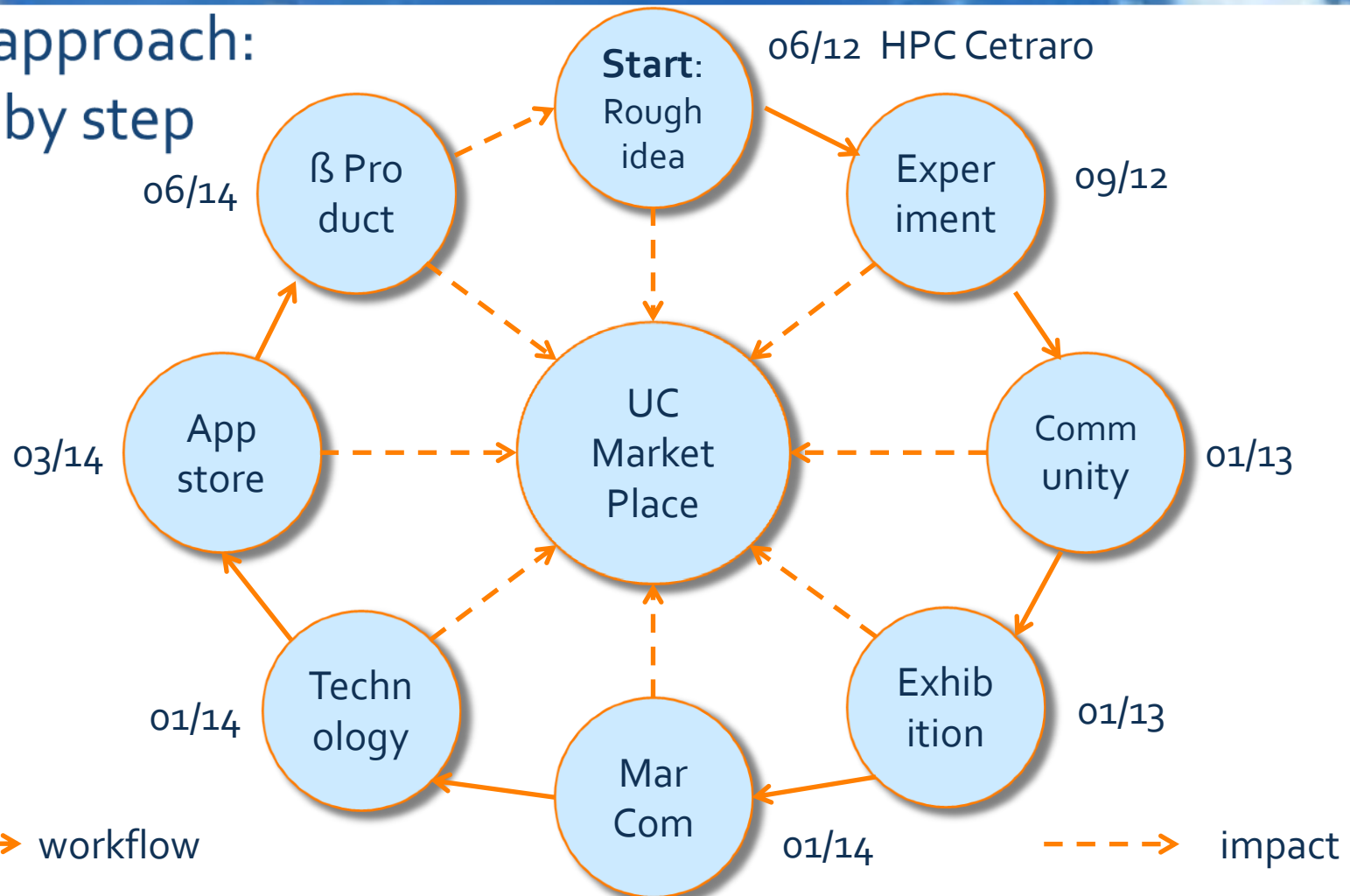
- + **Time delays:** Vacation times in July/August and December
- + **No standards:** Access and usage processes of hw & sw providers are different, some complex
- + **Hands-on:** Process automation at **providers** vary greatly.
- + **Lack of automation:** Currently the end-to-end process of the HPC experiment is manual (intentionally).
- + Participants spent relatively small portion of their time, some are responsive, others are not: **it is not their day job!**
- + Getting regular updates from Team Experts is a challenge **because this is not their day job !**



Building a marketplace demands building an ecosystem



Our approach:
step by step



Problem: today's crowded and ineffective cloud 'market'



Supply

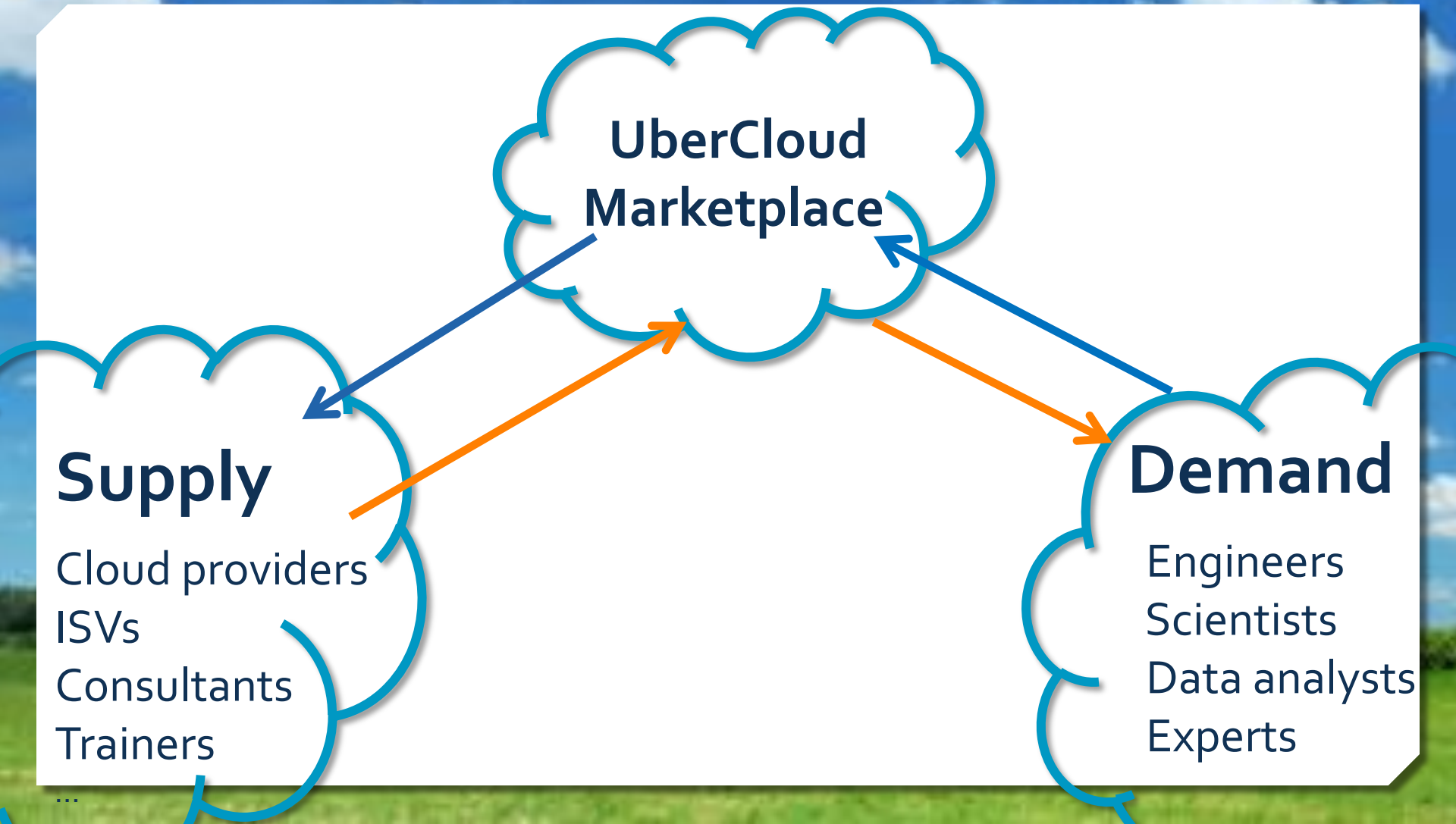
Cloud providers
ISVs
Consultants
Trainers



Demand

Engineers
Scientists
Data analysts
Experts

Solution: The UberCloud Marketplace



Solution: The UberCloud Marketplace



**UberCloud
Marketplace**

A large, light blue cloud-shaped outline with a darker blue border is centered on the slide. Inside the cloud, the text "UberCloud Marketplace" is written in a bold, dark blue sans-serif font.

**for 20+ million engineers and scientists
and their service providers
to discover, try, buy, and sell
computing time, storage, software and expertise
on demand**

Announcement at




UberCloud Marketplace

HOME | LOGOUT BURAK YENIER | MY PROFILE | HELP 



OpenFoam on AWS (starter)

OpenFOAM on 16 virtual CPU cores at Amazon AWS for 24 hours. Starter size, ideal for test runs.


 Price: \$99.00

[Add To Cart »](#)



CST Studio Suite on Nimbix (medium)

CST Studio Suite 2014 on 32 CPU cores for 7 days at Nimbix. Medium size, ideal for shorter production runs.


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Sim 360 subscription (starter)

Monthly subscription to Autodesk Sim 360 Cloud Service and advanced support. Excellent way to try Sim 360.


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Custom quotes from UberCloud providers

Tell UberCloud about your requirements and receive competing quotes from multiple providers.

 Price: \$0.00

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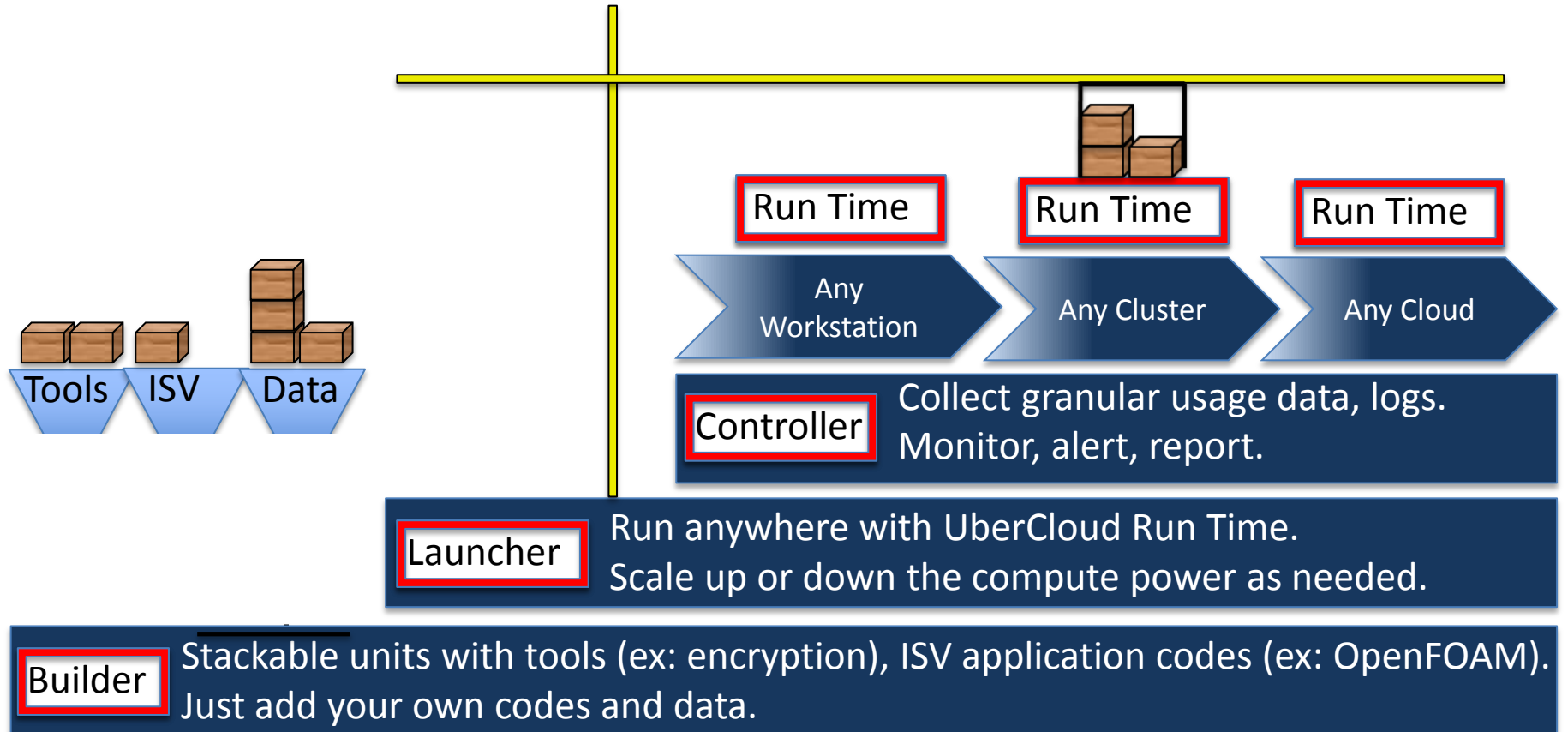
Solution:

Standard Cloud Run-Time Environment



- + Building thin, light-weight **run-time environment** (RTE) on top of Linux kernel features and open source tools, which
 - + provides a **standard** platform across distributed in-house, grid, and cloud resources
 - + facilitates access to all kinds of resources (workstations, servers, and private, hybrid, and public clouds)
 - + moving **portable, stackable units** including end-users app, data, tools seamlessly btwn in-house and external resources
 - + enables **portability** across different in-house and external resources (federation)
- + **reducing / removing** many of the cloud challenges

Build once, run anywhere





Portable Units are like containers

- + Standard software units (with user's app, data, tools etc.) can be moved seamlessly across any set of resources.
Units are
 - + stackable and portable,
 - + built from a base unit with standard functionality (security, encryption, compression, monitoring, data transfer, etc)
 - + extended by the ISV's software as next layer,
 - + top layer is the end-users configuration and data.

Next Steps: Reducing / Removing Cloud Challenges



Challenge *)	Addressed today	With UberCloud **)
Portability	low	high
Security	medium	high
Software Licenses	low	medium
Data Transfer	low	medium
Compliance	low	medium
Standardization	low	high
Cost & ROI Transparency	low	high
Resource Availability	medium	high
Transparency of Market	low	high
Cloud Computing Expertise	low	medium

*) Cloud challenges are addressed low, or medium, or high

**) When UberCloud is fully developed two years from now



It's your turn now 😊

- + [Download 2013 Compendium of case studies from HPCwire](#)
- + [Download 2014 Compendium of case studies](#)
- + [Register at TheUberCloud.com](#)
- + [Try the UberCloud Marketplace](#) with \$1 voucher and you get

+ NOW



NOW

The UberCloud Community and Marketplace

Thank You !

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