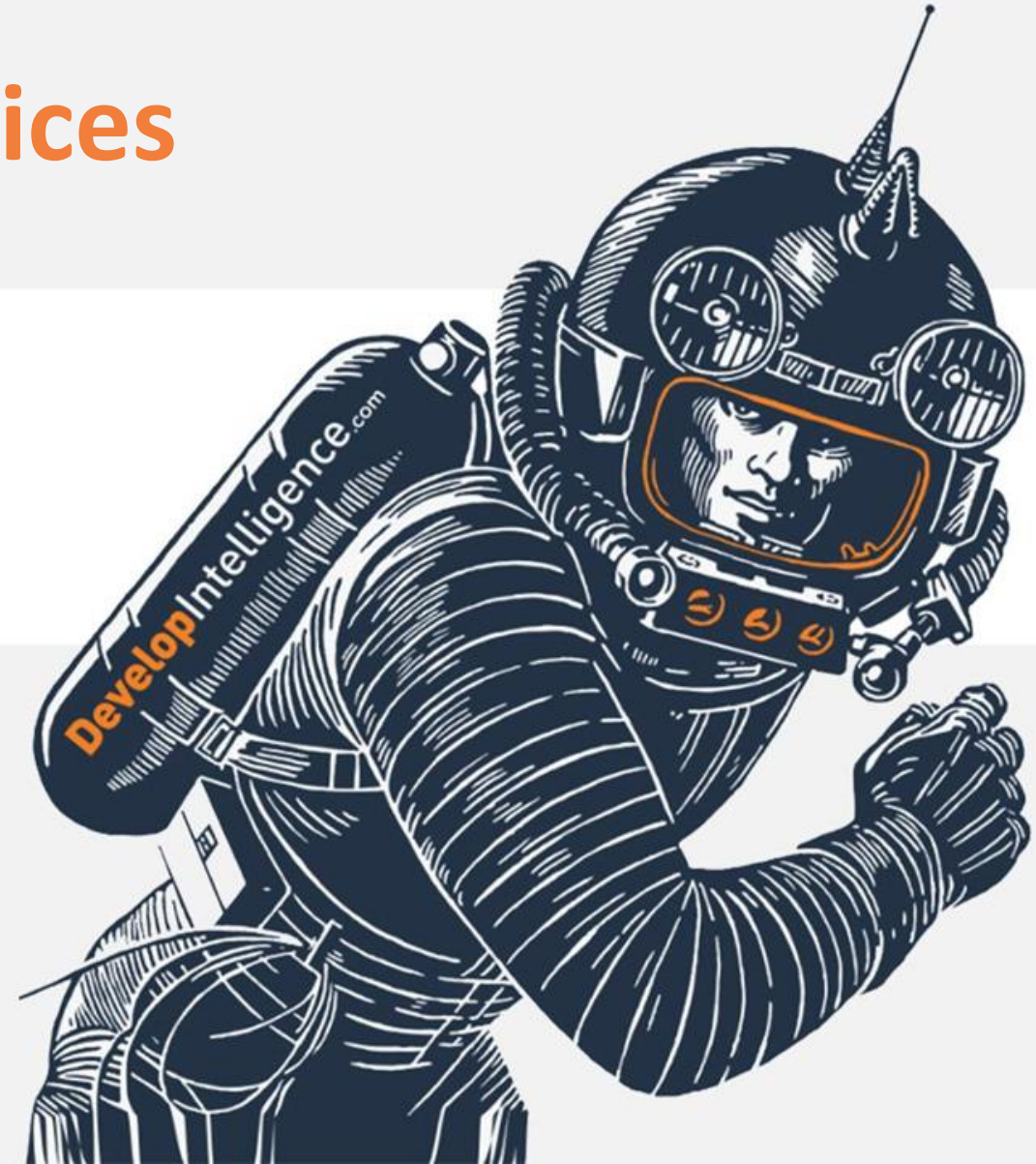
VMWare Launch - Working with Cloud

Cloud Services



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Class Roadmap

Cloud Services

- Much of our discussion so far has been on infrastructure – VM's, network, storage, data, etc.
- However, the Cloud offers much more in the way of capability and services
- Potential benefit of these services
  - Readily available on all major Cloud platforms
  - Relatively easy to configure (though not necessarily easy to integrate)
  - Can take advantage of Cloud scale

Cloud Services

- Sophisticated services that bring business value
- Enable expansion of the services ecosystem of your enterprise into new areas of differentiation and segmentation
- Key thing to remember – just because a service is available does not mean that you must use it (or even should use it)
- There should be an architectural vision in place for leverage of the Cloud that is directly aligned with business value

Cloud Services

- Why? Because Cloud services will have a cost associated
- The cost must be accounted for and justified as operating expense against business drivers
- With good alignment and a good plan, sophisticated Cloud services can help accelerate business mission

Cloud Services

There are a multitude of services exposed by CSP's and that list continues to grow – we're going to do a high-level overview of just a few of them:

- Machine Learning / Artificial Intelligence
- Mobile Support Services
- Data Management
- Internet of Things (IoT)

The good news is that the other LAUNCH tracks will give you an opportunity to dig deeper into them as the program progresses.

Machine Learning / Artificial Intelligence

- Technology and computer systems are phenomenal at “crunching” large amounts of data
- When Cloud-enabled with access to the scale of the Internet, the amount of data that can be processed and the complexity of the “crunching” can increase severalfold
- Machine Learning is considered a subset of Artificial Intelligence

Machine Learning / Artificial Intelligence

- Involves system algorithms that can improve automatically over time by learning from “experience” (depending on configuration)
- This “experience” comes largely through the aggregation and processing of large amounts of data
- The data provides a view as to what happened in the past
- That information can be used to make “predictions” (or calculated assumptions) about the future

Machine Learning / Artificial Intelligence

- Machine learning algorithms are used to build mathematical models from existing data
- Results in a mathematical “trajectory” (and confidence level) for how new data will behave going forward
- The algorithms can be configured to learn and improve over time as more and more data is gathered and processed
- Three common approaches include:
  - Supervised learning
  - Unsupervised learning
  - Reinforcement learning

Supervised Learning

- The algorithm is provided with input data and expected output data
- The system learns by mapping and correlating the two
- The efficacy of the intelligence gained is dependent upon the accuracy of the inputs and outputs

Unsupervised Learning

- The algorithm is given the data
- It uses Artificial Intelligence to dynamically discover and learn from patterns seen in the data
- The learning will likely be iterative – improving over time and with additional data volume

Reinforcement Learning

- The algorithm operates in an environment in which a sequence of steps is performed toward a specific goal
- Positive and negative ongoing feedback is provided as steps are executed
- The system attempts to minimize the negative and maximize the positive

The Turing Test

The **Turing test**, originally called the **imitation game** by Alan Turing in 1950,[2] is a test of a machine's ability to exhibit intelligent behaviour equivalent to, or indistinguishable from, that of a human. Turing proposed that a human evaluator would judge natural language conversations between a human and a machine designed to generate human-like responses. The evaluator would be aware that one of the two partners in conversation is a machine, and all participants would be separated from one another. The conversation would be limited to a text-only channel such as a computer keyboard and screen so the result would not depend on the machine's ability to render words as speech.[3] If the evaluator cannot reliably tell the machine from the human, the machine is said to have passed the test. The test results do not depend on the machine's ability to give correct answers to questions, only how closely its answers resemble those a human would give.

https://en.wikipedia.org/wiki/Turing_test

Machine Learning Examples

- See https://www.businessinsider.com/shane-wighton-robotic-basketball-hoop-cant-miss-2020-5
- See https://breakingdefense.com/2020/08/ai-slays-top-f-16-pilot-in-darpa-dogfight-simulation/
- See https://www.schwab.com/automated-investing/what-is-a-robo-advisor

Mobile Support Services

Develop Intelligence

- When building applications for mobile devices (tablets, phones, etc.), there are certain support services that are required

- Can include things like
  - Authentication / authorization
  - Integration with data and API's
  - Push notifications (general or targeted broadcast messages sent to devices on which the app is installed)

Mobile Support Services

- The Cloud can be used to provide an identity store and security mechanism for verifying and controlling user access over the Internet
- Platforms to support mobile testing
- Also several options (which we'll discuss shortly) for making data available to the mobile application

Mobile Support Services

- Application Programming Interfaces (or API's) can be leveraged for programmatic integration of the app with key business data
- Through hybrid facilities, there are also options for integrating data from both Cloud sources and on-premise sources as needed

Mobile Support Services

- Push notifications can be used to
  - Update devices with new information (e.g. new version available)
  - As a “callback” in response to an initiated action
- Underpinning these services, is access to Cloud scale
- Enables elastic adjustment to increase or decrease in demand based on number of app installs and number of users

Data Management

- CSP's provide several Cloud-enabled options for storing, aggregating and accessing data
- This is key because the data and how a company uses it to make decisions can be what differentiates it from its competition
- Options include relational databases as well as NoSQL or document-based databases

Data Management

- There are tools to help an organization discover new or existing sources of data across the enterprise
- Once discovered, there are tools to help facilitate the integration of that data into workflows
- There are tools to help “scrub” and normalize data from disparate systems into a unified format
- There are tools to capture large amounts of data and integrate with complex analysis tasks against the data

Data Management

- The are tools for helping users visualize the data in pictures & charts
- Provides “lift” vs. poring over a massive amount of simple columns and rows
- Can also help with visualizing patterns
- And key in all of this is ensuring that proper control and stewardship of the data is in place to maintain privacy and security

Data Management – Social Media

Exercise (10 – 15 min.): You and your team are going to be developing a new social media platform for connecting people. In your assigned breakout room, spend a few minutes brainstorming with your team on the following:

- ❑ What kinds of information and attributes would you want to track in a social media application to "make it work" – i.e. tables/columns, documents, etc.?

- ❑ What kinds of information would you want to track in a social media application to help you evaluate how popular your app is and what kinds of enhancements you could make to increase the user base (and profitability)?

Internet of Things (IoT)

- Supports the creation of a system of interconnected devices that can automatically transfer data of note over a network

- Examples include things like:
  - Temperature & humidity sensors in a data center to monitor climate
  - Sensors in remote oil fields used to monitor status of equipment without the costly requirement to have someone travel to the site to gather status
  - Sensors embedded into hand sanitizing stations that can notify a central management facility when close to empty (for efficient refill)
  - Security cameras that read data (e.g. facial recognition or GPS location) and pass to a central hub for tracking or triangulation

- The devices can be very sophisticated or very simple – depending on use case

Internet of Things (IoT)

- Data pulled by the device can be event driven or polled on a schedule
- Can generate massive amounts of data – the Cloud services previously covered are beneficial to gathering and harnessing intelligence in the data
- By leveraging Cloud scale, IoT systems can
  - Process data from all over the world
  - Quickly ingest it
  - Leverage Machine Learning to provide predictive analytics or predictive diagnostics

Internet of Things (IoT)

- Depending on the firmware (low-level coding at the hardware layer), devices may support both monitor and control
- Given the often-remote nature of the devices (and, therefore, less control over physical security), IoT systems should be built with security at top of mind

Internet of Things (IoT)

- Key components can include:
  - Explicit management of device registration
  - Proper role-based access control (RBAC) in place at both the device layer and in the back-end systems
  - Proper encryption of the in-motion data to ensure that only authorized agents can process the data and to help prevent tampering

Internet of Things (IoT) – Reference Architecture

Break (10 min.)

THANK YOU

Develop
Intelligence


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