Report on the Latest Technologies from IBM INNOVATE 2014

Scientific and Technical Information (STI) report on the latest cutting edge tactics, techniques, and procedures (TTP's) championed by the world's largest Information Technology (IT) Company, IBM. From June 1-5, 2014, more than 4000 professionals from IT, business, and engineering congregated and collaborated in Orlando, Florida at IBM's INNOVATE@SPEED IT conference for 2014. As the name implies, this conference mainly centered on reducing friction, increasing speed, and bring results to fruition faster. There were 33 tracks and over 500 sessions on many of the emerging best practices in the industry. This report will concentrate on the main enabling technologies being pursued today. In a nutshell these are: DevOps, Continuous Engineering, Cloud Computing coupled with Software-as-a-Service (SaaS), and briefly a mention of Big Data.

DevOps

Discussing DevOps first requires an explanation on what DevOps is. DevOps is short for development and operations, and as the name promises, it is a shortened, tightened up faster version of its' spelled out two words which are concatenated together. It brings together Agile and lean Tactics, Techniques and Procedures (TTPs). It is an emergent set of practices which revolutionizes the IT industry. It is where business owners, developers, operations and quality assurance departments collaborate together to deliver software and capabilities in a continuous manner. Enterprise applications are so diverse and comprised of such varied technologies, databases, and hardware, etc., that only an approach like DevOps could be successful in addressing all the complexities. DevOps is Agile on steroids and goes far beyond development and operations teams to also include stakeholders at every level; from business owners, architecture, design, quality assurance, security, all the way to end users, and remote customers.

To develop a use case for adopting and embracing DevOps, an understanding of the need for it and the challenges that it addresses is necessary. Of course, in DOD applications there is not a profit motive as in commercial use cases where speed of development and rapid deployment to market are all important. Yes, DevOps is a must in the new rapidly evolving area of business software applications and the rush to claim market share, for return on investment in the highly competitive business arena. The application of DevOps to systems of record, as many DOD systems are, must be seen in the new light of innovation. Whereas Amazon has achieved an 11 minute cycle for continuously developing, testing and deploying a new system, the case for applying DevOps to a system of record are not so obvious. Applications don't have to change so often and needs are met by delivering one or two large systems a year. However, the need for DevOps is just as vital. The need for a repeatable, reliable, verifiable way of testing changes are always needed, and even a system of record is not in a static environment. Besides being constantly assaulted by new hardware and software operating system upgrades and surrounded by new systems of systems in new network environments, such innovation is driven by emerging technology trends, like those covered at IBM INNOVATE 2014. Besides DevOps, these are Continuous Engineering, Cloud Computing coupled with SaaS, and Big Data. This was just an appetizer for DevOps, where there are many more parallels to Agile principles on steroids.

Continuous Engineering

Continuous Engineering is an enterprise TTP that speeds delivery of highly complex and sophisticated products by enabling engineers to derive and apply new emerging insights, while managing resources, quality and risk. Continuous engineering helps you deal with the many and myriad changes that ooze into your environment while you are trying to develop your application or system, or system of systems. Change is like a global cyclone that is swirling around you as you try to work. Gone forever are the days of trying to develop in a sequential manner going from point A to point B, because you will encounter new TTP's, thoughts, products, applications, and X the unknown, besides all the other letters of the alphabet. It is impossible to develop in a vacuum. It is necessary to branch out beyond traditional TTP's and standard operating procedures (SOP's) and embrace change. This is akin to the DevOps portion of systems engineering. At its heart it means accessing, unlocking, and understanding all engineering information, to inform your decisions and turn new insights into progressive outcomes and sharing those insights with all stakeholders. It also enables verifying requirements and design at all stages of development, minimizes re-engineering, and speeds implementation of execution. It follows the cybernetic process of having an operational system as soon as possible so that continuous course correction can be implemented. Another best practice of continuous engineering is strategic reuse to take advantage of sound engineering products across the entire life cycle.

One of the earliest examples of a single cycle of continuous engineering is illustrated in the story of the creation of the first Macintosh computer. Long story short, the team reworked components, learned and made their system smaller and faster. They took hardware and emulated it in software. They took software and turned it into microcode. When they finished, they threw everything away (but not what they had learned), because they said if they knew at the beginning of the process, what they learned along the way, they would have started in a completely different place and taken a completely different development path. Continuous engineering builds on the foundation of systems engineering TTP's to address change and tie together design plans and up-to-the-minute requirements.

Continuous engineering utilizes modeling and simulation (M&S) as part of its paradigm, where models are used to represent design entities at different levels of abstraction. These models help to envision the architecture and functionality of a system showing relationships and interactions between the elements of a system. Models help you to predict system performance and architectural alternatives very early in the engineering process, and help inform your design choices. The biggest payoff comes when you make your models executable so that you can run simulations to test your designs before you actually commit yourself to building the system. Continuous engineering also calls for continuous testing in true agile iterative fashion. This helps keep designs and requirements closely aligned. Model-based systems engineering (MBSE) and simulation help you to prosecute verification within and across systems engineering disciplines both early and often. Virtual products and virtual integration are cutting edge technologies that allow the continuous validation of complex systems before they are even created. This helps to also continuously avoid defects and optimize the design thus creating continuous quality. Even if defects are introduced, they are obvious and eradicated quickly. Much of this continuous engineering was on conspicuous display at IBM INNOVATE 2014. It was also coupled with and provided synergistic value realized in other enabling technologies like cloud computing.

Cloud Computing

Cloud Computing is simply the execution of computer applications and services via computers connected to a communications network. The Internet is quickly becoming the communications network of choice. It can be coupled with virtualization as a means to make many virtual servers appear to be one device. This has many benefits, one of which is absolutely guaranteed reliability. Cloud computing can be run on the multiple servers with automatic failover so that in the event of a hardware failure, the processing load is automatically distributed over other machines with no interruptions. This new paradigm is creating new business models with the capability to offer computer services in the form of Software-as-a-Service, also known as SaaS. There are also similar offerings known as Platform-as-a-Service (PaaS). Why the cloud? The point is that you don't have to buy computers, find a place to house them, provide power and environment for them, or administer and maintain them when they crash. With SaaS you also don't have to deal with configuring environments, loading software, applying licenses, doing backups, and other mundane computer care and feeding activities. Another capability and another Segway is the ability of being able to process large amounts of data with cloud computing, making it perfectly suited to big data applications.

Big Data

Big Data is a relatively new buzz word with new technology and accompanying TTPs. It does not just enable the processing and handling of vast amounts of information as its "Big Data" name implies. It uses new methodologies to speed that processing up and to store it in new ways so it will be readily accessible. It can analyze data while it is collecting it and consequently can make new assumptions about that data. Unlike most computer databases and programs, Big Data can deal with structured and unstructured data: data of all types and formats; text and digital data of course; but also picture data, audio data, and analog data as well. Along with Big Data comes an array of new computer software. This software is advancing the frontiers in the areas of artificial intelligence, natural language processing, statistical analysis, smarter and faster search engines, bio-metrics and facial recognition, and other even more advanced pattern-matching algorithms. The advances in our day-to-day lives are just beginning to be felt. Just think of the information applications at our finger tips with Twitter, Google, Verizon, Facebook, and Wikipedia. These are all areas that employ Big Data TTPs. There are also new applications just starting to be made in the areas of modeling and simulation, cyber warfare, logistics, and practically every other area of human endeavor.