Delivering
intent driven IT

wipro

n today's ever-changing business environment, cut-throat competition is the immense and fierce pace of innovation and execution is required to survive. Organizations face competition, not only from their traditional competitors, but also from start-ups and other innovative organizations whose products & strategies may potentially obliviate large and established players.

Digital and modern IT systems have ubiquitous influence. Successful commercial entities, businesses, and governments, along with the end consumers are interacting and executing most economic activities using the IT systems.

An organization requires IT systems, processes and skilled workforce to execute at the speed that matches the business demands. IT systems that can be almost instantly provisioned, scaled and de-provisioned directly by the business user, in real-time, are the need of the hour.

This whitepaper, describing 'intent driven IT' discusses what it is, technology & architecture, challenges and how can it be beneficial for the businesses.

Intent driven IT

What is intent driven IT?

An intent is an intention, purpose, goal or objective. In this whitepaper, we are primarily discussing IT needs (intent) of an end user. An end user could be an IT administrator, a software developer or a business user. An IT administrator may put forth his 'intention' such as I need a VM with 4 GB RAM, 4 vCPU, 500 GB SSD and 2 NIC cards with a dedicated IP address. Alternatively, a business user may put his IT needs much vaguely and at a high level, such as I need a machine capable of handling 200,000 transactions per minute for my e-commerce website that can host 12 stores with product catalog of 500,000 items.

Enterprise IT, more generally referred to here as simply IT, is a combination of compute (physical servers or VMs), network, storage, virtualization, orchestration and management tools and technologies. Refer the below diagram, which is a generic representation of various commonly found layers and components. It does not include a depiction of IaaS or PaaS layers or technologies such as containers (dockers), etc.
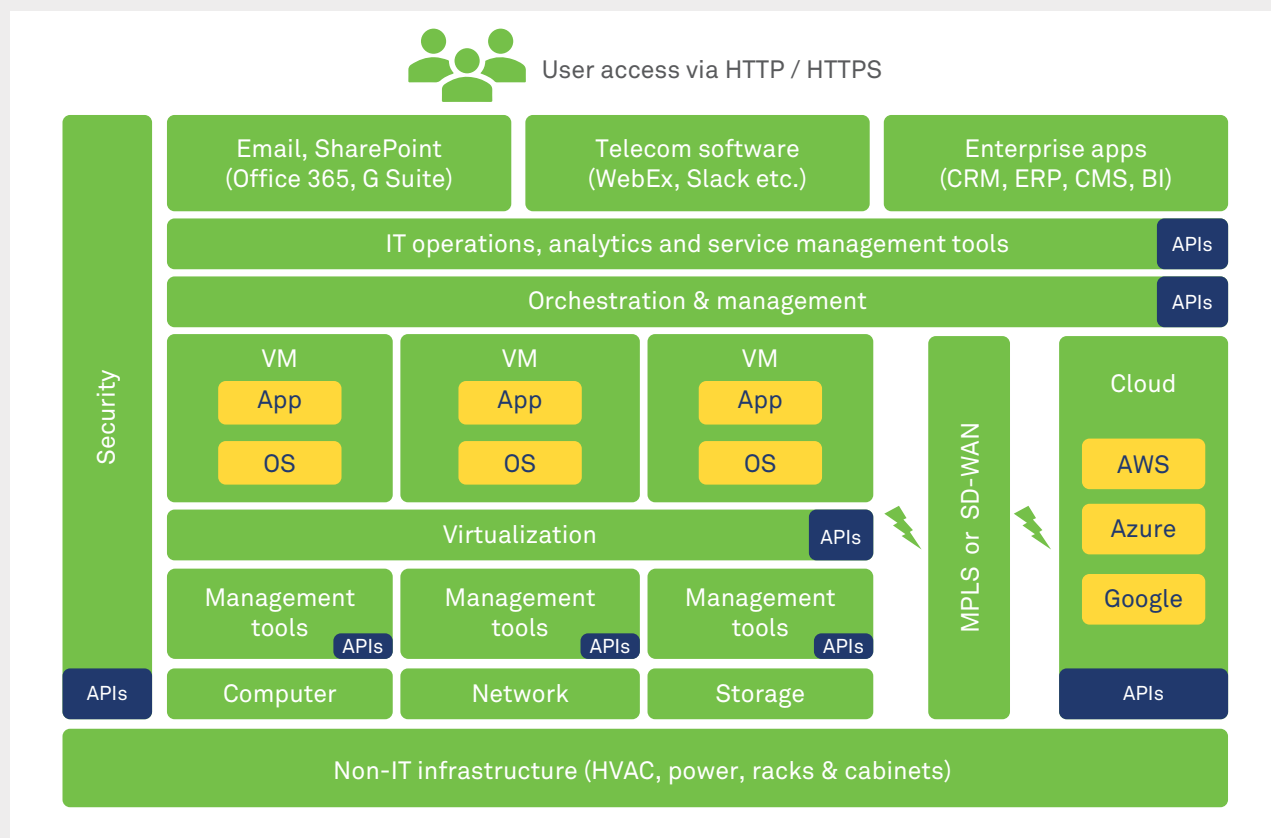

Figure 1: General representation of enterprise IT

The system status is continuously monitored, to validate and verify if the system has been provisioned and deployed as per the IT requirement.

In the intent driven IT system, an end user provides the high-level business intent (IT requirements) in simple English. These are converted into the IT configuration using AI, ML and NLP and other relevant technologies. These IT configurations are deployed/provisioned via APIs or Orchestration engine. The system status is continuously monitored, to validate and verify if the system has been provisioned and deployed as per the IT requirement; therefore the business intent is met. On success, credentials are shared with the requestor. On failure, corrective action is taken, and the AI system updates itself.

At the backend, the system also manages billing, metering, and chargeback w.r.t. the commercials; and the security, authentication and various approvals concerning the organization's IT processes. Only authenticated

requests are allowed and can provision & deploy resources as per the approved quota.

The possibilities do not end with provisioning and deployment of IT infrastructure alone. Installation of applications, databases, registering various services, reconfiguring load-balancers, updating directories (AD), setting up firewall rules is all possible.

AI/ML continues to learn and improve upon delivering Intent Driven IT. Here, the underlying principles are integration between data, applications and various IT components. It is assumed that most systems deployed here can receive some form of command and control requests either using APIs, SNMP or remote CLIs etc. There are few limitations to today's systems that we will discuss below.
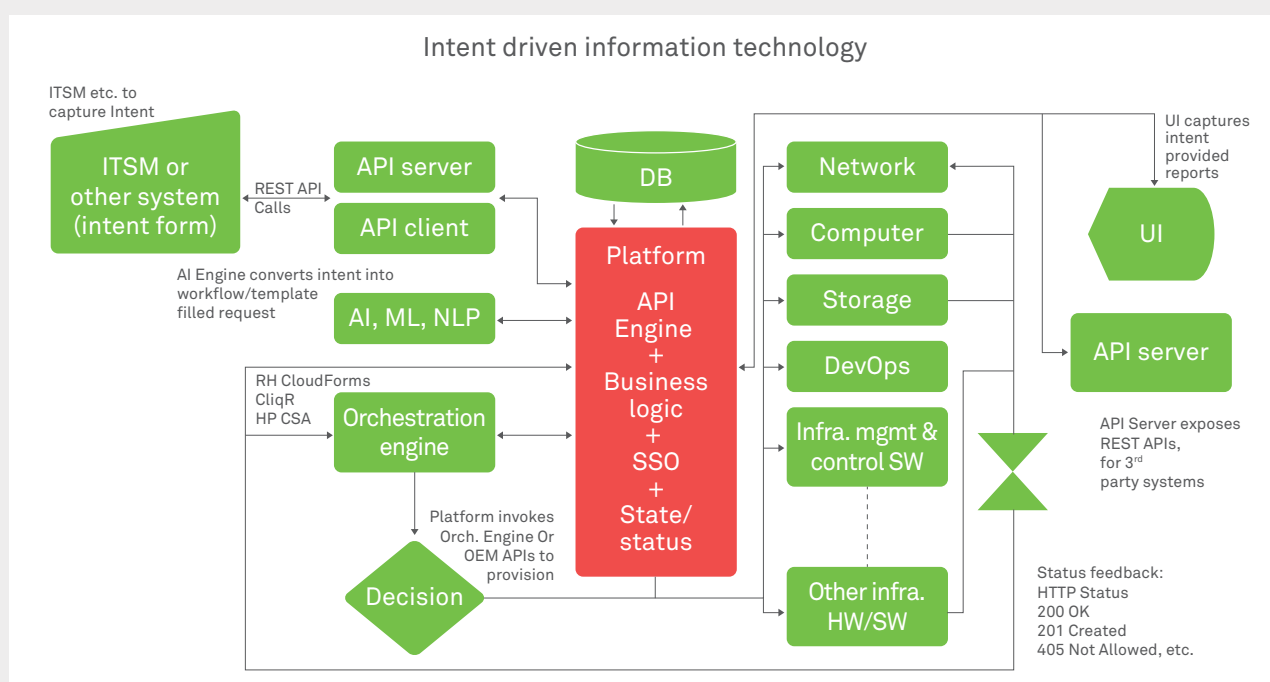

Figure 2: Architecture block diagram – intent driven IT

The above figure chalks out the significant sub-systems it takes to build an intent driven IT. Major sub-systems are described below.

End-user inputs
End-user inputs are captured via speech or text.

The high-level business intent is captured in the text form via any ITSM/BSM system, a GUI based form, a chatbot or any third party application used by business users.

Speech or voice inputs are captured using a microphone, or devices such as Amazon Alexa, Google Assistant, Microsoft Cortana or Apple Siri, which are all smart speakers and can be integrated using APIs.

These inputs are passed to the platform by calling the platform's APIs. This platform exposes functionality via REST APIs and can be integrated with any 3rd party systems.

AI, ML, NLP implementation
NLP (Natural Language Processing) system, depicted above, parses, tags, translates, extracts the user inputs, among other tasks, in the machine-readable format, possibly in key-value pairs, like JSON or XML. Evidently, JSON is gaining popularity over XML for reasons such as being lightweight, minimalistic and highly portable.

NLP systems have made significant progress. They can quickly do speech to text conversion, follow commands or give you answers to basic/simple questions. However, we have not reached a stage where they will be able to hold meaningful instinctive conversations, just like humans!

Using Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning machines analyze thousands or even millions of ways or examples, in which activities are performed to complete a set of tasks repeatedly under different circumstances, and teaches themselves the best methods to perform these complex tasks (i.e., training the AI/ML models using the training data), which otherwise requires some level of human knowledge, ability to take right decisions under changing conditions, and strategic thinking capabilities.

AI and ML convert these end-user inputs into IT configurations and provides to the platform, described below.

The platform
The platform is the centerpiece of control and command and can be coded in any modern application development ecosystem such as Python-Django, Java-J2EE or even Microsoft based .NET platform.

The platform receives and processes the end-user inputs in the 'IT Configurations' form from AI, ML system and takes a decision—which API calls to make and in what order. The platform calls APIs to deploy/provision resources which are available/can be requested via REST API calls. These are hardware and software systems for Storage, Compute, Network, DevOps, Orchestration, and management tools.

The hardware and software systems (Storage, Compute, Network, DevOps, Orchestration and management tools) execute the operations, as requested in APIs by the platform, and the response is provided back.

The platform also maintains business logic, single sign-on and other security, business logic and state & status. The platform also provides reports and RBAC for the admins.

What are the benefits of intent driven IT?

Simplicity
IT lingo is very domain specific, complex and not easily understandable by most people other than IT administrators and related teams. Although many organizations have adopted IT automation and generally a web-based form is used to capture the IT requirements of the end users. However, in reality, a business user needs to work with IT teams to fill up those forms appropriately, get approvals, and wait for 3 to 5 days to let the requested resources provisioned and deployed. Intent driven IT simplifies this and will be able to capture IT needs, in the same plain English, as the end user or a business user understands it.

Agility
With intent driven IT, 3 to 5 days will be reduced to few hours. Businesses will be able to provision and de-provision the resources on the fly. If pre-approvals and quota systems are also implemented, it may only require few minutes and not 3 to 5 days.

Cost

With intent driven IT model, delivery of enterprise IT will be genuinely an 'As-a-Service' model with pay-per-use costing. When the end users can switch on and switch off their IT resources at will, in real-time, this will cut down payments for unused hours and save on the cost.

Saving those lost business hours when businesses used to wait for the IT resources to come up, will be a thing of the past and gain in improved efficiencies.

Control

The end business users will have granular control when they are able to provision and de-provision resources at will, on the fly and scale up or scale down as per the needs of their businesses in real-time.

Overall experience for the business users will be effortless, cost-effective, unambiguous and quick.

Challenges and issues

Fully functional intent driven IT is the desired future. The limitations and challenges, considering today's Enterprise IT landscape are discussed below. There are three key stakeholders—product OEMs/ISVs, system integrators and enterprises/businesses. Then, there are challenges with respect to adoption, technology use cases, and others.

Product OEMs/ISVs

The product OEMs are innovating and bringing out software-defined systems and products. These tools and products provide open interfaces and can be managed via APIs (Application Programming Interfaces) calls from other systems.

System integrators

System integrators are the other key stakeholders. They have domain-specific knowledge, deep understanding of the end customers' requirements, and vast experience of integrating disparate products and technologies to build useful solutions. They are innovating and creating industry and vertical-specific optimized designs and best practices for implementation.

Large enterprises/businesses

Large organizations in various domains and verticals, such as Oil & Gas, Manufacturing, Healthcare, Media, Government, etc., desire to achieve intent driven IT in their enterprise IT systems and data centers.

However, there are challenges. A large chunk of legacy IT systems may never come up for a refresh and transformation as customers/businesses believe that they are serving the purpose they were built for.

Further, IT systems procured in the past 5 to 8 years, and not refreshed yet, do not offer any open interfaces, i.e., they are not software defined and cannot talk to other systems via APIs and neither can be configured and controlled programmatically, rather are siloed boxes.

In a datacenter, legacy and modern systems coexist, and it may not be possible to rip-n-replace or migrate everything to modern-systems for various reasons.

Product vendors, original equipment manufacturers (OEMs), independent software vendors (ISVs) have also been slow to transform their product lines into entirely Software Defined Systems with fully open interfaces (APIs), providing access to full functionality via APIs, which is otherwise traditionally available and accessed via CLIs (command line interfaces) or their proprietary GUI driven management software.

Building blocks of these Enterprise IT systems such as Storage, Network, Compute, etc., are evolving, but not enough to truly achieve intent driven IT today! For example, only a few vendors, and only some of their systems/products, provides complete control, segregation and quality of service (QoS) in their products so to maintain full control over throughput, IOPs, latency, or performance of the system in a multitenant environment. While, it is easy to virtualize and sustain multitenancy w.r.t. hardware resources; achieving the same across all layers and keeping the same control and complete segregation across the layers is still a challenge.

On the technology side, AI, ML, NLP, Deep Learning, neural networks, etc., are still evolving. Building useful AI models is difficult. AL/ML requires large set of data to learn/train itself. Enough training data is not available. ML models need to be continuously updated, to continue to learn new things.

For a technology partner, there is an opportunity while these holes & gaps in the product's features and functionalities continue to exist. One is with building those AI/ML models and training them. Two, there is also a need to write a piece of code and logic for integration across layers in the IT stack, or otherwise take a platform approach and make it a centerpiece to integrate with and drive all the control flow and data flow. System integrators are well placed to take advantage of this unique opportunity and create next-generation IT systems.

How to achieve intent driven IT?

Achieving intent driven IT could be a multi-year exercise. It depends upon the current state of IT infrastructure one currently possesses. However, few minimum guidelines are discussed below that may become a path to achieving real intent driven IT.

Modernize
Phase out legacy systems. Migrate to new systems that are programmable, software-defined and provides interfaces, to achieve integrations with other systems.

Automate
Achieve policy based and work-flow level of automation, where provisioning, deployments, monitoring & reporting, de-provisioning, health check, remediation, throttling & QoS, etc., are taken care of. Hyper automation enables orchestration that is executed from the very high level and within the security perimeter and guidelines.

Build an AI/ML-based platform or adopt third party systems
Build a platform that can integrate AI/ML technologies along with NLP systems and drive the intent driven IT in a phased manner. Also, consider adopting readily available platforms such as Wipro HOLMES™ that can expedite matters.

Conclusion

Intent driven IT will enable end users to demand and receive IT resources that match the agility, flexibility, and control that they require. It will also achieve better security, where IT resources will be continuously monitored; anomalies and threats will be automatically detected and responded with. Underlying hyperautomation will result in peak resource utilization and optimization, thus leading to saving cost, efforts and achieving better results, time-to-market and eventually happy, satisfied customers, employees, and partners.

About the author

Jitendra Kumar Jain
Senior Manager, Strategy Office,
Global Infrastructure Services, Wipro Ltd.

Jitendra brings 17 Years of experience in operating at the intersection of Business and Technology in IT Infrastructure and Applications domain. He has been leading teams to develop IT products & tools, doing pre-sales, building engineering teams from scratch, marketing and managing alliances with start-ups and mid-size partners.

Jitendra's diverse background includes leadership role at an outsourced product development services firm he co-founded and managed, the role of Engineering Program Manager at NetApp Inc. and as a Member of Technical Staff in various software products development and architecture teams.

Jitendra holds a Bachelor of Engineering degree in Electronics & Communications engineering from Gulbarga University and is a Project Management Institute Certified Project Management Professional (PMP). He is married with two children and lives in Bangalore, India.

● **Wipro Limited**
Doddakannelli, Sarjapur Road,
Bangalore-560 035,
India

Tel: +91 (80) 2844 0011
Fax: +91 (80) 2844 0256
wipro.com

Wipro Limited (NYSE: WIT, BSE: 507685, NSE: WIPRO) is a leading global information technology, consulting and business process services company. We harness the power of cognitive computing, hyper-automation, robotics, cloud, analytics and emerging technologies to help our clients adapt to the digital world and make them successful. A company recognized globally for its comprehensive portfolio of services, strong commitment to sustainability and good corporate citizenship, we have over 160,000 dedicated employees serving clients across six continents. Together, we discover ideas and connect the dots to build a better and a bold new future.

For more information, please write to us at **info@wipro.com**