Structure of resources in an enterprise IT organization subject to optimal defect detection

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Abstract – **At a decade of distributed cloud, hyper-automation, digitalization, Internet of Things (IoT) world, use of large volume IT resources in business is inevitable. Organizations use vast amount of IT systems to automate processes and tend to focus on digitalization at all costs. Automation and day-to-day business require huge computing power at a high-availability and reliability. Cybersecurity is crucial for success of every business. To address these needs, organizations must have in-depth understanding of their own resource structure (assets, network, services, applications, relationships, etc.). This paper focuses on how organizations can keep information about their resources and analyzes how organizations can ensure optimal defect detection in its own resource structure.**

This paper proposes unique approach for structuring of multi-layer resources, focused on formalization of detection, localization, and effective defect remediation.

Keywords – **CMDB, IT resources, optimization, structure**

I. Introduction

Changes and outages are part of day-to-day life in each organization. With the penetration of more and more IT systems and automation of different processes and activities, organizations are required to maintain constant increase of computing power – more servers, databases, network devices, etc.. Critical business services rely on sustainable environment, thus, to allow outcomes to be delivered on-time and as per agreed volume and quality.

To ensure there are no service degradations and outages, organization implement processes and systems to monitor and proactively respond to any disruptions or potential issues. Most organizations maintain configuration management database (CMDB) which usually is in the form of a database that contains all relevant information about hardware and software components used in an organization information technology (IT) service and the relationship between those components. Use of CMDB provides an organized view of organization configuration data and allows data examination from a desired perspective.

Within the context of a CMDB, components of an information system are referred to as configuration items (CIs). A CI can be any IT component, such as software, hardware, business or technical services, documentation, personnel and many more. CMDB also tracks any relationships and dependencies between CIs. [1]

Configuration management provides information on the CIs that contribute to each service and their relationships: how they interact, relate, and depend on each other to create value for customers and users. This includes information about dependencies between services. This high-level view is often called a service map or service model, and forms part of the service architecture. [2] Fig. 1 represents simplified diagram showing how multiple CIs contribute to an IT service.

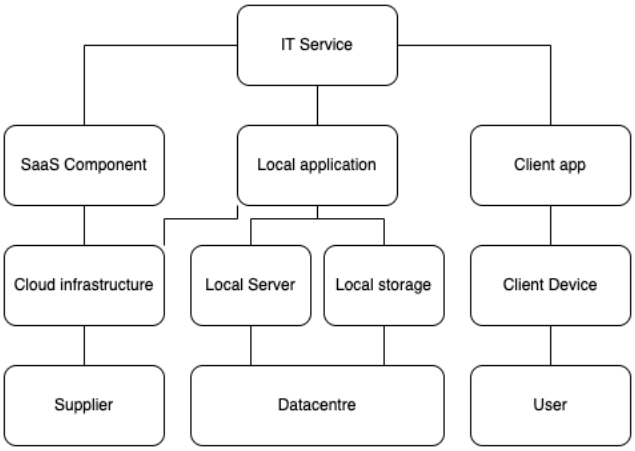

Fig. 1. Simplified service model for a typical IT service

Small and medium-sized enterprises (SMEs) and large enterprises adopt different practices to increase the quality of their services, to provide services that better meet customer expectations and to decrease cost of delivering services, by reducing the wasted cost and effort. Commonly, organizations use ITSM (Information Technology Service Management) practices and often they adopt best practices represented in the ITIL (Information Technology Infrastructure Library) framework.

ITSM are the activities/practices that are performed by an organization to design, build, deliver, operate, and control IT services offered to customers. Differing from more technology-oriented IT management approaches like network management and IT systems management, IT service management is characterized by adopting a process approach towards management, focusing on customer needs and IT services for customers rather than IT systems, and stressing continual improvement.[3] The CIO WaterCoolers' annual ITSM report states that business uses ITSM "mostly in support of customer experience (35%) and service quality (48%) [4].

ITIL is known as a framework designed to standardize the selection, planning, delivery, maintenance, and overall lifecycle of IT (information technology) services within a

business. The goal is to improve efficiency and achieve predictable service delivery [5].

CMDB is often found as part of ITSM platforms or suite and is referred to as "the heart of your ITSM system", as each ITSM practices rely on quality CMDB data – for example how to best investigate an outage of business services if your CI database doesn't track relationship of the underlying CIs.

According to Gartner "IT service management tools are vital for infrastructure and operations organizations to deliver business value in the services they provide." [6]

In this paper you will find comparison of some of Gartner leading IT Service Management Tools – ServiceNow, BMC, Ivanti and Atlassian [6], focus will be on how those tools empower their users to effectively maintain and monitor structure of resources at a large-scale and allow optimal defect detection in a comprehensive structure of CIs.

II. Tooling and Technologies

Software as a Service (SaaS) is a software distribution model where software provider host applications in the cloud and make them available to end users over internet. SaaS applications are widely used across the business with perspective of further expansion in coming years. SaaS help organizations to easily implement and use applications, without need to setup or maintain the software. Often SaaS has subscription-based model providing access to ready-to-use solution.

ServiceNow is a software as a service (SaaS) for technical management support. Platform specializes in IT services management (ITSM), IT operations management (ITOM) and IT business management (ITBM), allowing users to manage projects, teams, and customer interactions via a variety of apps and plugins. [7] Platform also delivers digital workflows that create great experiences and unlock productivity. [8] ServiceNow focuses on providing single platform connecting IT and other digital teams, using digital workflows, AI and custom application capabilities.

ServiceNow has one of the most powerful CMDB applications, that allows business service mapping and enables clear visualization of complex CI structure. Out-of-the-box, platform comes with enhanced CMDB structure, that meets the needs of most organizations. Using platform dashboard capabilities, users can easily monitor health and quality of all Cis and CMDB data.

ServiceNow is a Leader in Gartner Magic Quadrant.

BMC provides powerful, people-centric solutions called BMC Helix ITSM. BMC Helix ITSM focuses on ITSM process, aligned with ITIL v4 practices, offers auto-classification, assignment, and routing of incidents, as well as embedded multi-cloud capabilities. BMC Helix ITSM customers can integrate easily with tools such as Jira or perform cognitive email analysis.

Although BMC product seems to be bit more complex, it offers advanced ITSM that supports the needs of mature organizations with well-defined ITSM processes. BMC Helix ITSM offers robust CMDB.

BMC Helix ITSM is positioned as a Leader in Gartner Magic Quadrant.

Ivanti Neurons is another solution that provides services around IT Service management, user management, unified-endpoint management, asset management and endpoint and network security. Ivanti provides visibility over the entire IT estate and empowers its users to make quick decisions, it also allows users to manage assets, perform software distribution, remote access and other. Users can build queries and quicky get access to specific information. [10]

Ivanti Neurons offers self-service experience for end users. Due to its differentiated product roadmap, Ivanti Neurons is suitable for medium to large organizations.

Ivanti is found as a Leader in Gartner Magic Quadrant.

Atlassian is well-known company for its products for software developers and projects managers. Their ITSM solutions called Jira Service Desk helps organization manage IT Service Management processes. Jira Service Desk offers to its customers request queues, self-services solutions, good reporting, and metric capabilities, as well as ready to use integrations to Slack and Microsoft.

Gartner positions Atlassian as a Visionary in its Magic Quadrant.

Jira Service Management product strategy is focused on the convergence of digital experiences for development, operational and business teams. Its operations are geographically diversified, pricing is transparent, and its clients tend to be small to large organizations. Atlassian's ITSM tools roadmap includes further investments into ITOM capabilities and low-code workflows.[6]

All four technologies have found their way into different organization, helping them to meet their needs and resolve day-to-day business issues. They all support Discovery services, which allows organizations to run probes though the network and detect and add CIs into the CMDB. Customers easily import and maintain their asset data and build integrations with 3rd party solutions to synchronize data.

III. Structure of resources

Enterprise organizations resource structure is extremely complex. Number of CIs can be from hundreds of thousands up to millions of items. Proper structure of CMDB is crucial for easy maintenance and on-going use of the asset data. Immature organization do not realize the importance and often fail to implement optimal structure of their asset data, stipulating solid ground for future issues with CMDB and seamless run of ITSM or other CMDB-relying on processes.

To ensure organization can adopt good structure of their resource data, organizations should adopt proper physical and logical models of their data. In this paper focus is on physical model.

Proposed physical model concept is tier oriented. Organizations can group resources in 6 tiers. Tier structure covers Business Processes, Outcomes, Services, Software, Logical Infrastructure and Physical Infrastructure.

As shown in Fig. 2 Example Conceptual model, there are multiple components and dependencies underneath any business process or business outcomes. Business Processes rely on outcomes and offering of other services to deliver their outcomes. Services are supported by software which

can include, but not only, application packages and deployments, application and infrastructure software, database instances, etc., respectively components of software tier rely on logical infrastructure (cloud environments, virtualizations clusters, logical clusters – fail-over, load balancers, virtual servers, and others. Bottom level tier is the physical infrastructure, where everything runs - physical servers, racks, network gear, communication endpoints, VLANs, IP addresses/network. In physical infrastructure we can also find printers, voice and video equipment, storages and any other devices that support the business.

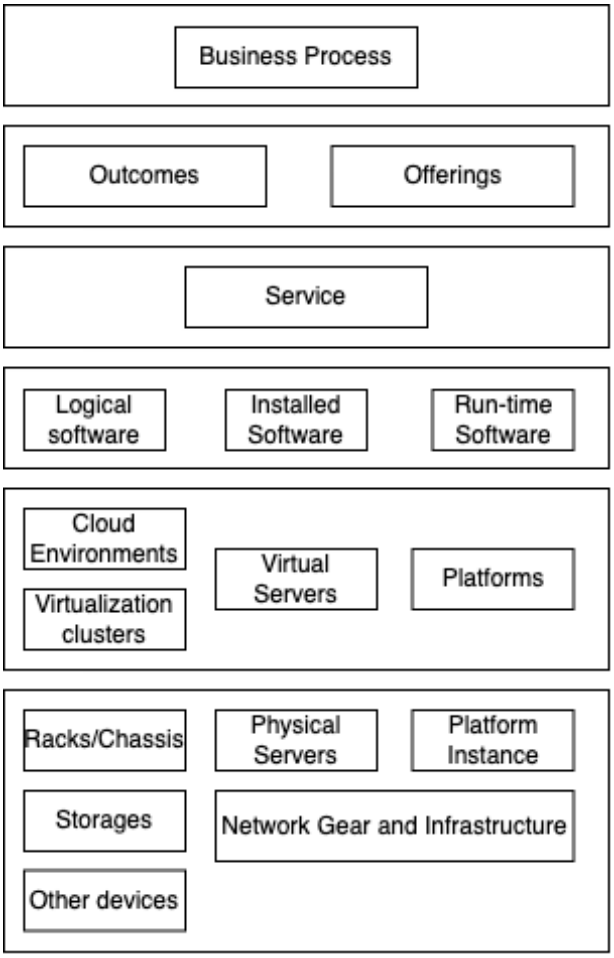

Fig. 2. Example Conceptual model

Often components from one model depend on/run on/subscribe to components from other model/s, which makes the structure of resource quite complex.

Due to the complexity of the model or CMDB data, often organizations fail to inform or involve all stakeholders when incidents or changes requests arise, thus having an algorithm to identify all dependency, respectively all stakeholders, is an important task of providing high availability of the services.

IV. Conclusion

With proposed tier structured model, organizations can ensure that all CIs are grouped and positioned in proper tier level, based on their function. Algorithmically, we can iterate throughout the structure to the level where owners/stakeholders are defined (usually tier 3, on Service level).

In the common case where we observe complex structures with multi-level dependencies between CIs, algorithm can be applied to reach to the service level and identify owners and stakeholders. By doing so, we ensure that right groups of people are notified, and defect detection and remediation will be timely addressed.

This paper defined high-level physical model to manage and maintain complex CI data. This model is subject to algorithm three-walk, which could be implemented in the technologies analyzed in section II Tooling and Technologies. Algorithmic solutions and its implementation will be subject of another publication.

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