Case study:

How we modernized a large pharmaceutical company through the integration of a cloud-based IT infrastructure

Part I
Nov 2021 - May 2022

Background

"Bul Bio - National Center of Infectious and Parasitic Diseases [BB-NCIPD]" is a large state-owned company that specializes in the manufacture of vaccines, immunostimulants, bioproducts, blood derivatives and a whole range of other pharmaceutical consumables.
The company is one of the oldest in the country and has been at the forefront of medical innovation for 150 years. Its product portfolio spans more than 600 medications, including the BCG vaccine, which Bul Bio exports worldwide.

Following current European healthcare trends, Bul Bio finds itself in need of more computing power, operational safety and technical optimization.

Case

The IT infrastructure that Bul Bio has been relying on in the past years no longer meets the expectations of the organization in terms of capacity, computational power, security, and scalability. MY Synergy has been tasked with solving this problem, with the most obvious solution being an upgrade, or possibly even an overhaul of the company's entire IT infrastructure.

Solution

We approached the project with a detailed client assessment and an analysis of the advantages and disadvantages of several potential solutions. After careful consideration, we made the decision to overhaul the entire IT infrastructure, but to do so in phases, so as to avoid any mishaps along the way. Redesigning the technical base of a large and well-established pharmaceutical company is an incredibly complex task, and even a small indiscretion can jeopardize the entire process.

Naturally, we had to be incredibly deliberate in our execution. Our solution was to go for a hybrid data center, which consists of an Azure base backed by a local server. To achieve our objectives, we undertook three key phases:

1. Creation of a new Azure-based infrastructure and integration with the local base
2. Migration of the existing local infrastructure to the Azure cloud

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Stage 1: Building a new Azure-based infrastructure

At the very start of the project, we had to identify the infrastructure points with the highest priority. These are the critical services, which enable the rest to function uninterrupted. Early detection of these pressure points ensures the continuing operation of all primary services, because they are the first to be secured in the Azure cloud. Clearly, our main concern was the integrity of Bul Bio's operations. We were laser-focused on ensuring business continuity - not just in the future, but during the project itself. As we mentioned earlier, a lot can go wrong during an undertaking of such scale and complexity. And the worst of it is to compromise the client's daily operations.

Geo-redundant data centers

With business continuity our main concern, the first practical step was to set up geo-redundant data centers. Azure operates data centers in different geo-redundant zones, located in various geographic locations. That is to say, different continents on different tectonic plates. This makes the data centers independent in terms of power supply, cooling and internet connectivity, which protects them from natural disasters. Geo-redundancy is essential for data centers as it is the first line of defense against outside threats.

Zone-redundant data centers

The next layer of protection is to make the data centers zone-redundant. With this approach, data centers are administered by different teams, which alleviates the risk of human error. Zone redundancy provides high availability on a service level. If one data center fails, the service continues working undisturbed in real-time.
Finally, what's truly important is to have both levels of protection. Geo-redundant data centers are essential for disaster recovery, while zone-redundant data centers are crucial to keep operations running.

RTO & RPO

RTO [Recovery Time Objective] and RPO [Recovery Point Objective] are indicators used as a base for the development of an infrastructure that meets the client's specific business requirements. RTO defines the time necessary for a service to be restored according to the needs of the business. RPO determines the maximum threshold for data loss following restoration. These are benchmarks, and the minimum objectives must be met for the business to remain operational. Once these policies had been agreed upon for every business service, we established zone-redundant workloads in combination with geo-redundant Azure backup and disaster recovery for service availability. This approach ensures that both redundancies cover the RTO and RPO policies for data and service recovery.

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Data security

It was around this point that we began work on the next safety layer - the one concerning data security. First, we established a connection between the local data center and Azure via a VPN Gateway, which is redundant in two zones. Next, we ensured that we have an Active Directory in the cloud, and that it's backed by up to three domain controllers. What's more, each domain controller had to be located in each of the local data centers. This way they would function as interchangeable backups, while also responding to requests of the nearest clients and synchronizing data among themselves in real-time.To guarantee that nothing can endanger the infrastructure, we also made use of Azure's security toolset.

Azure security posture management

Azure allows the infrastructure to be protected by a whole multitude of tools. As Bul Bio is considered a company of strategic importance to national security, we had to be extremely strict when it comes to safety. Here are the various applications that we activated, along with a brief description of their functionalities.

- Defender for Cloud - provides vulnerability scanning and antivirus protection, as well as compliance assessment against best practices and ISO standardization
- Azure Monitor - utilized for the monitoring of infrastructure parameters, Azure Monitor offers alerts when it spots deviations from the established performance norms. These include, but are not limited to, computational capacity, disk capacity, and software indicators.
- Azure Sentinel - a cloud Security Information & Event Management [SIEM] tool that collects and stores audit, as well as event logs in a central, immutable repository. This powerful software conducts cross analytics to asses potentially malicious attacks through the use of Artificial Intelligence [AI]. The tool protects against the most sophisticated attempts at breaching the infrastructure, which generally target multiple, as opposed to singular parts of it.

SCADA validation

To complete the first phase of the project, we needed to obtain developer-level validation that our newly built infrastructure is SCADA-compliant. Bul Bio uses SCADA [supervisory control and data acquisition] production systems to verify the quality of its manufacture process. These systems are designed to be logically separated from the general infrastructure for compliance and security reasons, so we did just that - we separated them. However, since we essentially set up a new infrastructure, it had to be assessed and approved by the SCADA developer before launch.

Stage 2: Migrating the local infrastructure to the Azure cloud

After successfully building a new, cloud-based infrastructure, we continued to the next phase of the project, which was to migrate the existing base. The main objective of this stage was to fully transfer the workloads from the local servers to the Azure cloud, which would grant us the ability to redesign the on-premise infrastructure. To enable the necessary migration, we utilized the Azure Migrate tool. MY Synergy implemented the process in four separate phases:

Discover

The first step of the migration process was to generate a snapshot of the infrastructure by installing an Azure Migrate on-premise tool locally. This tool can detect servers and software and establish the interconnections between them. We identified every element that's subject to migration.

Assess

Next, Azure Migrate conducts an in-depth assessment of all the data it has discovered in the previous stage, and we gain access to an inventory of all the components yet to be migrated. This enables us to make informed decisions about the design of the infrastructure once it's in the cloud, ensuring that critical services remain uninterrupted.

Migrate

The migration step involves the automatic copying of all of the input elements from the assessment phase. During the migration phase, all servers in the cloud are switched off. However, they're synchronized in specific time intervals, similar to how disaster recovery is set up. This enables the local servers' gradual phase-out and step-by-step activation in the cloud. While this guarantees that operations remain uninterrupted, the crucial part is that it offers a fail-back. We can run it locally and recover if something doesn't function properly upon migration.

Modernize

The final step of the migration process is modernization. After we have migrated everything and deactivated local services, we can redesign the entire infrastructure to optimize cost and performance. We use various Platform as a Service [PaaS] and Infrastructure as a Service [IaaS] solutions. Think database and application layers powered by the managed service infrastructure of Microsoft's cloud versus that of your local server.

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Statistics & Impact

65%
increase in computational capacity due to introduction of Azure infrastructure

36%
increase in productivity due to migration to the Azure cloud

85%
improvement in infrastructure safety due to Azure security toolset

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Conclusion

Our step-by-step approach and structured method have enabled us to complete the first two stages of the project.

A new cloud-based infrastructure has been created, increasing capacity and productivity. The local infrastructure has been migrated to the cloud, improving business scalability and efficiency.

These achievements would be enough to end the project. However, our policy of iteration until perfection compels us to complete the third and final stage. This will reinforce our efforts and ensure that Bul Bio's business thrives on a pitch-perfect IT foundation.

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