cegeka

Case Study

NEC

Software Reshaping Private Branch Exchange (PBX)

Customer **NEC Corporation of America**
Industry **Telecommunication**

Company description

NEC Corporation of America is a subsidiary of NEC Japan, a provider of information technology (IT) services and products, headquartered in Minato, Tokyo, Japan. It provides IT and network solutions to business enterprises, communications services providers and to government agencies, and has also been the biggest PC vendor in Japan since the 1980s.

The company was known as the Nippon Electric Company, Limited, before rebranding in 1983 as just NEC. Its NEC Semiconductors business unit was one of the worldwide top 20 semiconductor sales leaders.

Project description

PBX stands for Private Branch Exchange, which is a private telephone network used within a company. The users of the PBX phone system can communicate within their company and the outside world, using different communication channels.

MA4000 project focus was on PBX management (private branch exchange programming) to respond to the needs of business communication of private companies and other customers with specific needs, such as hospitals, hotels, universities, etc.

Traditionally PBX administration has been performed by engineers with deep telecom know-how. This solution provides web frontend and a set of backend services that can make PBX administration more uniform and easy for the PBX types provided by NEC (SV9100, SV9300, SV9500, IS3000 and 3C). Moreover, it has automation functionalities (e.g. scheduled recurrent PBX synchronization) and other additional features as SIP (Session Initiation Protocol) terminal management.

The MA4000 team develops the global version of the MA4000 product for NECAM (NEC Corporation of America). NECNL team develops MA4000 for the EMEA region, relying on NECAM (NEC Corporation of America) code and adding support for EMEA-specific PBX (IS3000).

Challenges

— **Project complexity due to sheer size** (>3 Million Lines Of Code codebase). Abstractions over different PBX interfaces help in creating a consistent UI but also make changes and debugging harder (it takes more time). Also, the PBX-specific functionality is plugin-able and this increases the overall complexity of the project.
— Aside from project organization, one of the challenges is to **store data in two places**: PBX and database. This brings more complexity to the project, which makes synchronization a priority as well.
— **PBX has no support of transactions**.
— Last but not least, proposing **technically feasible options** to a traditional company, and help them in their effort to move to cutting-edge technologies

Solutions

— Developing applications in **Docker containers** - To respond to the challenge of providing a solution that can be delivered as on-premise, scalable and also ready for deployment in the cloud.
— **Identity server 4 with OAuth** – New authentication solution for multiple apps with a "Single Sign-on" (before, NEC used Center Authentication Service – originally developed at Yale University)
— **Elastic search (ELK Stack)** – Easily configurable
— **Licensing** - Changing the way a vendor designs custom product activation (depending on the clients' requests and needs)

Results

— MA4000 team has developed a **scalable communication platform** that can be easily scaled and deployed in Cloud
— **Process automation** (e.g. integrating NEC proprietary face recognition algorithm)
— **Developing NAP**, a multifunctional platform that offers web collaboration, instant messaging, WhatsApp connector, open source authentication with Identity Server
— **Extending the previous applications** by adding new APIs to platform applications, which changes the way a vendor designs custom product activation, integrates with 3rd party software etc. to meet the client's requests and needs

Team setup

We embrace Agile methodologies in most of our projects and we do it by the book.
The project development team consists in 13 IT specialists based in our local headquarter: 11 developers and 2 testers. Given that MA4000 project represents just a piece of the entire project Cegeka administrates and develops for NEC, the MA4000 team collaborates with other 5 internal teams from USA, The Netherlands and Romania.

Moreover, the team works closely with the Client Service and Infrastructure teams, including project managers, sales, marketing and design specialists.

Types of activities

Maintenance, support and new features development

Architecture and technology

The project's architecture consists in concept documents, discussed by all implied teams from USA, The Netherlands and Romania.

Used methodology

Agile - SCRUM

Main technologies

.NET (C#, ASP.NET, WebAPI, WCF, EF), JavaScript and frameworks (Angular), Typescript, MSSQL

Other technologies

.NET Core, C++, Azure, Docker