NEC's Digital Platform Underlying DX Offerings

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Abstract

Digital transformation (DX) has become a key to survival for organizations. The establishment of IT systems and services that enable organizations to promptly respond to changing business needs is no longer just an option, but a requirement. To rapidly roll out DX offerings to address this challenge and to ensure the safe and stable use of the systems and services offered, NEC has developed the NEC Digital Platform, a common platform that brings together NEC's strengths. This paper provides an overview of the NEC Digital Platform and also describes the characteristics of its development/execution platform as well as its operation/management functions that enable us to meet a wide range of customer needs.

Keywords

cloud services, common platform, multi-cloud, execution environment,

data utilization of operation functions

1. Introduction

Since the Ministry of Economy, Trade and Industry (METI) released a report titled "Report on Digital Transformation: Overcoming of '2025 Digital Cliff' Involving IT Systems and Full-fledged Development of Efforts for Digital Transformation" (the DX Report) in September 2008, the term DX, otherwise known as digital transformation, has spread and many companies have become more aware of the importance of digitalizing their business. The subsequent spread of the novel coronavirus infection (COVID-19) has further amplified this awareness, turning digitalization efforts into a deciding factor between corporate success and failure.

In this rapidly changing and unpredictable environment, organizations are increasingly called upon to analyze data as well as quickly launch and continuously improve services that meet the true needs of customers. Without the right IT systems in place, it would be impossible for organizations to flourish. To address this challenge, NEC has developed the NEC Digital Platform, a cloud service that provides a common platform to quickly and flexibly resolve customers' issues. This platform is first being rolled out in Japan with plans to expand globally in the future.

The NEC Digital Platform will use cloud-based, advanced technologies; improve connectivity with other systems and services; and apply multi-cloud operation management while leveraging NEC's extensive experience and knowledge in meeting diverse system needs. This will enable customers to use cloud services with greater stability and peace of mind. Furthermore, by combining standardization based on best practices with flexibility to meet diverse requests, the NEC Digital Platform will provide a basis on which to support NEC's suite of DX offerings that are designed to solve the challenges facing customers.

This paper first provides an overview of the NEC Digital Platform in Section 2, followed by an explanation of the development/execution platform as well as the functions for operation and management in Section 3. Finally, we introduce a proof of concept (PoC) application that was developed using functions of the NEC Digital Platform.

2. The NEC Digital Platform

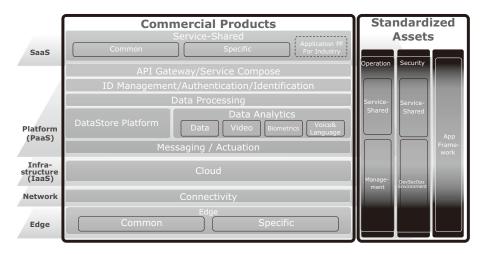As shown in **Fig. 1**, the architecture of the NEC Digital

Fig. 1 NEC Digital Platform architecture.

Platform is comprised of two groups: commercial products and standardized assets. The commercial products group contains five layers: software as a service (SaaS), platform as a service (PaaS), infrastructure as a service (IaaS), network, and edge computing. Through these layers, value is delivered directly to the customer. This is supported by the standardized assets group that contains the operation and security layers that provide the platform for development and execution as well as the functions for operation and management. By using a common platform made of this architecture, NEC will be able to quickly provide high quality DX offerings that contribute to solving a variety of issues for customers around the world.

In particular, by leveraging standardized assets of the NEC Digital Platform, NEC aims to accomplish the following goals through the cloud service.

- Develop cloud-native methods to enable the quick provision of better services
- Centralize operation methods and structures to enable the provision of appropriate service levels

For the rapid provision of better services, we are mainly promoting the streamlining of UI development, unification of execution environments for containers and provision of knowledge, and provision of references for data utilization as related to the development/execution platform.

In addition, for appropriate service levels, we are working to standardize processes and tools based on ITIL to achieve the fit-to-standard approach.

3. The Functions of the NEC Digital Platform

This section describes what NEC delivers through use of common global platform of the NEC Digital Platform.

3.1 Characteristics of the development/execution platform

NEC has prepared development frameworks and tools to deliver systems that meet customer needs in a timely manner. However, it has been difficult to increase speed and flexibility, because the execution environment differs from project to project.

As a solution three measures based on NEC's technical capabilities have been implemented in the NEC Digital Platform. These three are: limiting the types of execution environments for developed services, providing development environments that assume an operational execution environment, and supporting the launch of development projects. These measures enable us to provide a consistent software lifecycle from development to execution and operation, thereby improving development efficiency and implementation methods.

3.1.1 Component-oriented user interface development

Intuitive use of the system without hurdles for users is one of the keys to maximizing the effectiveness of service utilization, and the user interface (UI) is an important factor to achieving that. However, it is a difficult task to develop a variety of services while pursuing both speed and flexibility to create a look and feel in UI that best meets the needs of both the market and customers. In contrast, the development of component-based user interfaces (CoUI) enables increased speed and flexibility in the upstream, implementation, and operational phases.

CoUI focuses on the universality of the CRUD (create, read, update, and delete) operations in the components of the services and uses standard components, which have two major characteristics.

One is that we are expanding the range of components with a set of UI designs and implementation libraries that can be used in prototyping tools. This enables quick and flexible trials in the upstream process during the proposal/design phase where demonstration models (demos) are created in prototyping by copying and pasting components. In addition, as a result of these trials, the optimal library can be quickly utilized and implemented during the implementation phase to accelerate the development speed of services.

The other is that our design philosophy incorporates Atomic Design, a methodology used in component design that emphasizes reusability, and CoUI components are set at the optimum granularity to avoid becoming monolithic. As a result, during the operation phase, the maintenance of a range of equipment can be minimized for greater speed and flexibility in response to change.

3.1.2 Uniform execution platform and improved development platform for containers

Until now, the standardization of service development has been a challenge, because it is necessary to first understand the execution platform that differs for each project before proceeding with development.

The NEC Digital Platform has improved the speed of development by unifying the execution platform for production and by creating a development platform to attain delivery to the execution platform as standard.

For the execution platform, we adopted Kubernetes (K8s), which is the industry's standard platform for containers, to create uniform methods for deploying applications and scaling systems and then we added non-functional requirements for commercial use.

To be more specific, in addition to designing an environment where container images can be acquired without going through the Internet, we have included the non-functional requirements that are essential for corporate activities such as the encryption of communications, access control, and vulnerability detection.

The development platform has an automated build/test deployment mechanism that is triggered by source code changes and deployed to the execution platform without going through the public Internet. This improves quality, cost, and delivery (QCD) in microservices development by ensuring that applications are always tested and delivered efficiently and securely.

By vertical integration of the process from development to the delivery to the execution platform, the time to market (TTM) for IT services is reduced.

We also provide hands-on practice and tutorials in the development of container applications through Scrum-based sprints to accelerate launches by development teams that leverage the NEC Digital Platform.

3.1.3 Data utilization platform

Based on the growing importance of data utilization, the NEC Digital Platform provides data utilization platform as the execution platform necessary for the integration and utilization of data.

When previously dealing with data, it was necessary to consider how to combine services and products in accordance with the data every time, and the architecture of the execution environment was not standardized.

To solve this problem, the NEC Digital Platform has established standard use cases and requirements for data collection, storage, integration, and management based on NEC's experience and has standard configurations that combine various services and products from Amazon Web Services (AWS). These enable users to quickly introduce data utilization platform and to collect, visualize, and analyze business systems, IoT, and a variety of other data on that platform for efficient service development.

Also, these will be linked so that they can be used in combination with the aforementioned container-centric development/execution platform. This enables data integration, visualization, and analysis on a single platform, enabling smooth visualization and utilization in analysis of data entered in applications.

3.2 Features of operational functions

To date, NEC has been developing its own portals and using a ticket system that uses Redmine and other solutions in operations. Although systems that are easy to use can be built by customizing, for proprietary development and Redmine, the maintenance costs required to maintain the functions and the measures that have to be taken to utilize the data for development will be challenges.

The NEC Digital Platform therefore has an architecture that can be used to reduce maintenance costs, link with various cloud services, and expand functions by changing the system based on the data structure of the tools that are the de facto standard to achieve the fit-to-standard approach.

In addition, when implementing operations, as part of our support for launching development projects, we avoid implementing operations with proprietary data structures and conduct requirements definition so that operations are implemented according to the data structures prepared as a standard. We standardize design

and implementation by aligning with standard require-ments management flows and minimizing proprietary implementations to increase development speed and maintainability.

4. Demonstration Experiment Using Provision Function of the NEC Digital Platform

We conducted a proof-of-concept (PoC) application for service development on the NEC Digital Platform to veri-fy both the effects of service development and the imple-mentation of standard operational functions by using the development/execution platform described so far.

For this PoC, we developed functions in the system configuration shown in **Fig. 2** that can be used to en-able the registration of investment information and the visualization of return on investment as part of the deci-sion-making support in investment management within NEC. The details of the verification conducted by this PoC are shown in Fig. 2.

- Quick value creation and implementation of UI prototyping and implementation using CoUI to register investment information
- Accelerated development of applications on the container platform using development/execution platforms (EKS, GitHub) and scrum development through development best practices using these platforms
- Visualized returns on investment in a short period of time based on investment information by com-bining the development/execution platform with the data utilization platform
- Standardization of operations, such as failure no-tifications and temporary support, for developed applications in cooperation with the operation/management functions using standard tools

Thanks to this PoC, we confirmed that in terms of de-velopment a demonstration model could be created in
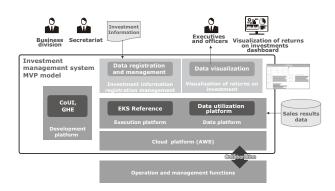
three hours and a secure minimum viable product (MVP) could be developed in four weeks. And on the operation-al side, we confirmed that it would work for operational standardization. In addition, to solve the problems of application development and data linkage information faced by service developers, a reference guide based on verification details has been prepared and released to the public. This will help our customers with the rapid development and delivery of cloud-native service appli-cations.

5. Conclusion

This paper describes how NEC will contribute to the rapid provision of flexible cloud services that meet cus-tomer needs by providing a development/execution platform and operation/management functions as a common global standard platform.

In the future, by leveraging these capabilities and linking many of NEC's technologies, we will increase the number of proposal-based DX offerings that solve our customers' problems and help them expand their busi-nesses.

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Fig. 2 Investment management PoC chart.

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