



Third Year Internship Report

Epitech, Toulouse

Harry Viennot
October 2023 to May 2024

Special thanks

I would like to thank the whole team and its managers who allowed me to carry out this internship in good conditions.

Olivier Jean, my internship tutor, Expert Production

Guillaume Mercier, Manager Leader

Laurent Rougé, Team Leader

Gaetan Menat, Expert Systèmes & Cyber

Vincent Battery, Ingénieur Production

Thomas Saniez, Ingénieur Production

Florian Teulet, Ingénieur Production

Thomas Rein, Ingénieur Production

Romain Gely, Chef de Projet

Olivier Bancharel, Ingénieur Production

Introduction

This is my internship report for the internship I carried out at BPCE-IT at the Balma Toulouse campus, which started on the 12th of October 2023 until the 31st of January 2024 for two days a week on Thursdays and Fridays, and full time from the 5th of February 2024 to the 31st of May 2024 as part of the curriculum for my 3rd year at EPITECH Toulouse.

Throughout my internship, I was supervised by Olivier Jean, expert production in the company, and Guillaume Schmauch, innovation hub manager at EPITECH.

This report will be split into two parts:

The first section is destined to a new employee in the company. They will be taking over the various projects on which I have worked on.

The second is destined to my manager, and its aim is to convince them to let me be a part of a new project I am interested in.

These instructions come from the assignment for the internship report, as specified by the school.

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Section 1: Handover Manual for Newcomer

Presentation of the company

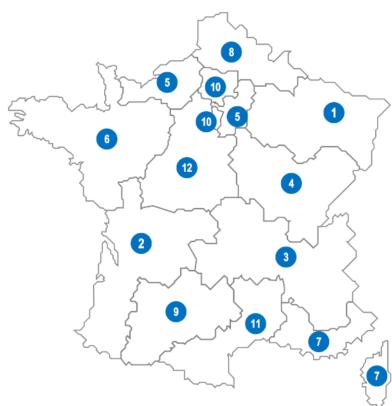
- BPCE-IT contact information

Company	BPCE Infogérance & Technologies
Head office	110 Avenue de France, 75013 Paris
Toulouse office	56 Route de Lavaur, 31130 Balma
Website	www.bpce-it.fr
Legal status	Economic Interest Grouping (EIG)

- The BPCE Group

BPCE is a major player in France's banking scene, created after the 2009 merger between Banque Populaire (BP) and the Caisse D'Épargne (CE). With a workforce of over 100 000 employees, it provides its services to 35 million users worldwide, ranging from individuals, professionals, businesses, investors and local communities. It is recognised as the second largest banking group in France, following BNP Paribas, and finances more than 20% of the French economy.

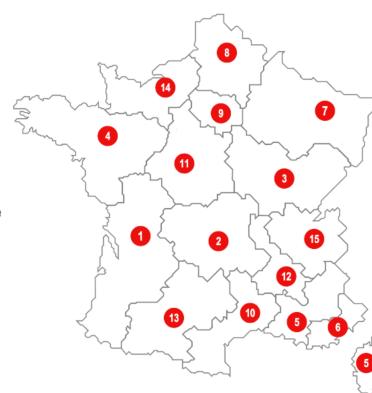
Within the BPCE Group, the central organ contains a network of 14 Banques Populaires and 15 Caisses d'épargne, along with BPCE Solutions Informatiques and BPCE Infogérance & Technologies under its direct supervision. BPCE SA is the control center and coordinates the group's strategy and operations. The group's network includes subsidiaries such as Natixis, Casden, Oney, Banque Palatine, and Crédit Coopératif.



14 Banques Populaires

dont la CASDEN et le Crédit Coopératif

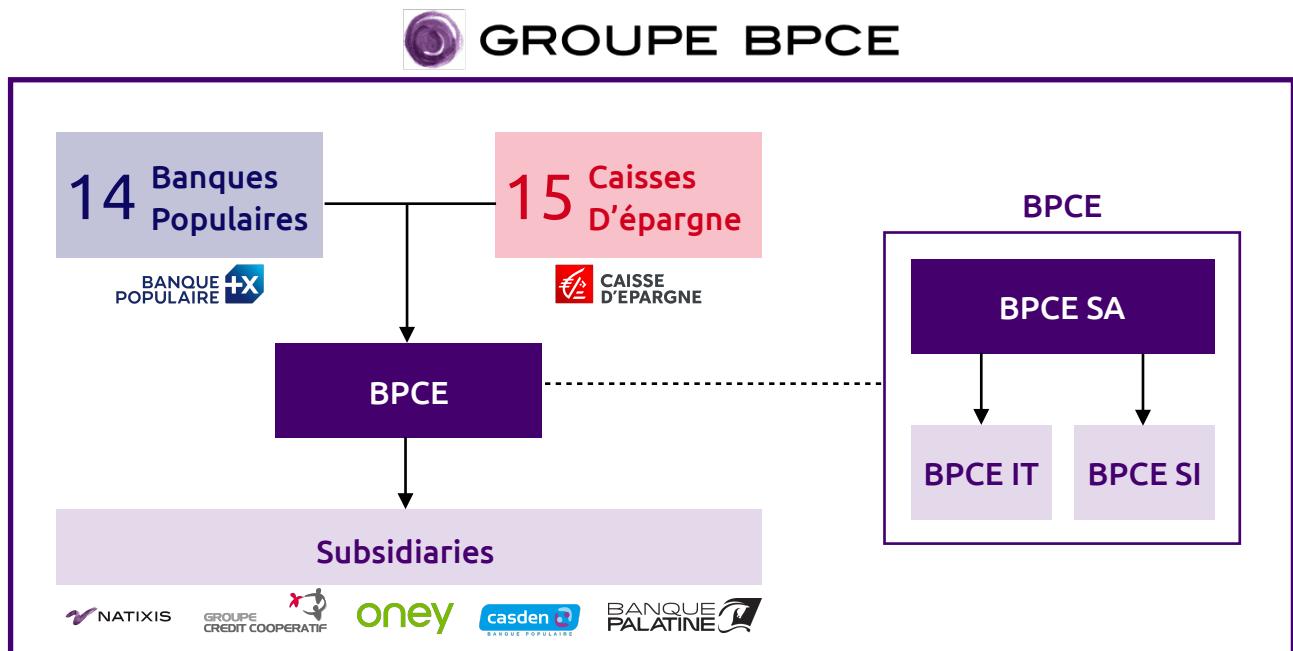
- 1 Alsace Lorraine Champagne
 - 2 Aquitaine Centre Atlantique
 - 3 Auvergne Rhône Alpes
 - 4 Bourgogne Franche-Comté
 - 5 BRED Banque Populaire (1)
 - 6 Grand Ouest
 - 7 Méditerranée
 - 8 Nord
 - 9 Occitanie
 - 10 Rives de Paris
 - 11 Sud
 - 12 Val de France
- Compétence nationale :**
- 13 CASDEN Banque Populaire
 - 14 Crédit Coopératif



15 Caisses d'Epargne

- 1 Aquitaine Poitou-Charentes
- 2 Auvergne et Limousin
- 3 Bourgogne Franche-Comté
- 4 Bretagne Pays de Loire
- 5 CEPAC (1)
- 6 Côte d'Azur
- 7 Grand Est Europe
- 8 Hauts de France
- 9 Ile-de-France (2)
- 10 Languedoc-Roussillon
- 11 Loire-Centre
- 12 Loire Drôme Ardèche
- 13 Midi-Pyrénées
- 14 Normandie
- 15 Rhône Alpes

Here is a diagram showing the structure of the BPCE Group:



- **BPCE Infogérance & Technologies**

Founded in 2015, BPCE IT was set up to consolidate the group's IT infrastructures, bring together resources, streamline processes to cut costs and boost the quality of service, all in support of the group's business goals. BPCE IT is a crucial entity because it ensures the maintaining and upgrading of IT systems 24/7 for the Banques Populaires, Caisses d'épargne, BPCE SA and its subsidiaries.

BPCE IT is driven by three key objectives: elevating the quality of service for both employees and clients, enhancing cybersecurity measures to effectively manage cyber risks, and improving the working experience for its employees, particularly advisors, to contribute towards business growth.

With a team of more than 1650 employees and 900 contractors spread across 14 locations in France, BPCE IT manages an infrastructure that includes over 80,000 servers, more than 80 petabits of storage, and processes over 21 million emails monthly, showcasing its crucial role in the digital and operational efficiency of the BPCE group.

- **Departments**

BPCE IT is divided into 8 primary divisions each further branching into numerous sub-teams, and in turn, those sub-teams into more. This organisational strategy comes from an interesting company policy: no team should have more than 10 members. This policy is put in place to maintain efficiency and manageability as larger teams are more likely to face coordination challenges and decreased productivity. Whenever a team grows beyond this size, a new team is created under the parent team, and a new Team Leader is appointed. Here is the outline the 8 major divisions, their responsibilities, and how they align with the goals of BPCE IT.

The **Direction Générale** (Management) are at the head of BPCE IT and handle all the operations and technology strategies.

The **Secretariat General** (Secretariat) handles the legal and regulatory adherence, finance, IT operations and projects, and communication of the company.

The **Tour de Contrôle** (Control Tower) monitors and supervises services, handling incident, crisis, change, and problem management while also focusing on quality and continuity management, process and tool implementation, and maintaining customer relationships with the subsidiaries.

The **Sécurité Informatique** (Information Security, DIS) section develops cybersecurity strategies, ensuring the protection of cloud environments, data, applications, and network systems while managing access and responding to threats through a dedicated Cyber SOC.

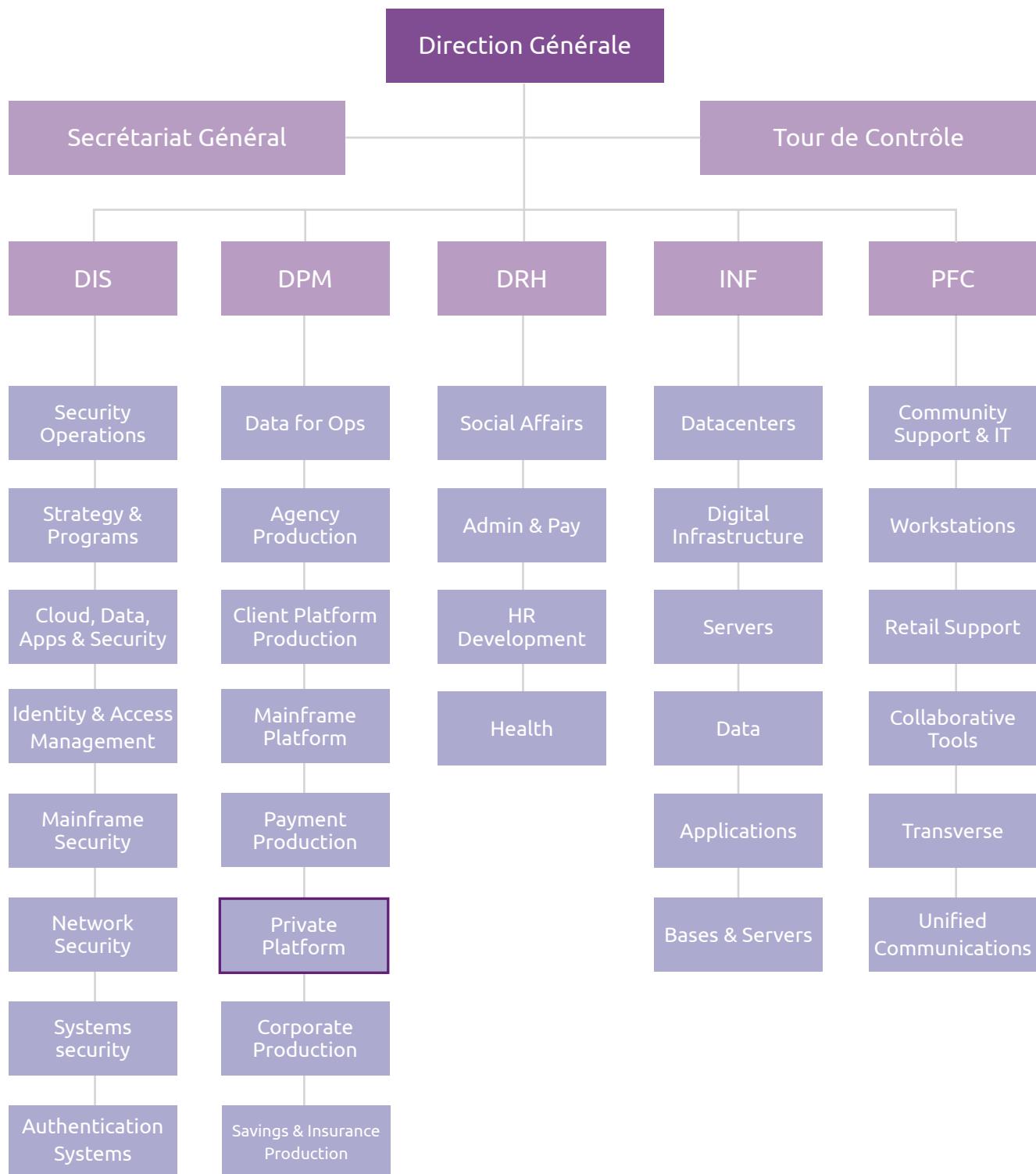
The **Production Métiers** (Business Operations, DPM) covers the technical and operational support for various business units, including agency operations, customer platform services, payment services, savings and insurance services, data operations, corporate IT direction, mainframe platform, and private platform management.

The **Ressources Humaines** (Human Resources, DRH) is dedicated to promote a healthy work environment, overseeing HR management systems, and addressing social affairs.

The **Infrastructure** (Infrastructure, INF) section is the technological backbone of the company, responsible for telecommunications and networks, data centers, data management, foundational IT architecture (including servers), digital infrastructure, and the production application platform.

The **Plateforme Collaborateurs** (Employee Platform, PFC) section focuses on workplace technology, collaboration tools and messaging, unified communications, and cross-departmental support, including retail and IT community support.

Below is an organisation chart that should help you visualise the hierarchy of departments within the company:



Glossary

API

(Application programming interface) An intermediary that allows two applications to communicate. APIs enable data extraction and sharing within and across organisations.

ARTIFACT

A by-product of the software development process, such as source code, dependencies, binaries, or resources, represented differently based on the technology.

CLOUD

A global network of interconnected servers with unique functions, operating as a single ecosystem. The cloud is a large, non-physical entity of remote servers around the world.

CLUSTER

A group of servers and resources acting as a single system, providing high availability, load balancing, and parallel processing.

CIA

(Code d'Identification Applicatif) A project identification code composed of a short establishment name (2 letters) and a unique application identifier (3 letters) to facilitate project recognition and organisation. Example: Project Adequasys for BP Occitanie = OCADQ.

CONTAINER

A lightweight, standalone, executable software package that includes everything needed to run a piece of software, including the code, runtime, system tools, libraries, and settings.

DEPLOYMENT

The process of delivering applications, modules, updates, and patches from developers to users.

DEPLOYMENT PACKAGE / PACKAGE

An instance (version, revision, tag) of an application defining the content to be deployed, whether the entire application or specific components.

DEVOPS

A set of practices, tools, and cultural philosophies that automate and integrate software development and IT operations processes.

PIPELINE

A set of automated processes and tools for development and operations teams to compile, construct, test, and deploy software code efficiently.

PULL REQUEST

A method to change, review, and merge code in a Git repository, originating from branches within the same repository or forks of it.

RELEASE

The actual deployment of a specific version of software to end-users. It includes new features, fixes, and is accompanied by release notes.

RELEASE TEMPLATE

A predefined set of guidelines and checklists designed to standardise the release process, ensuring consistency and thoroughness.

Presentation of the team

- Team Overview

You are now part of the **GPR - Guichet SI Établissements** team, part of the **PPR - Plateforme Privative** subdivision of the **DPM - Productions Métiers** division !

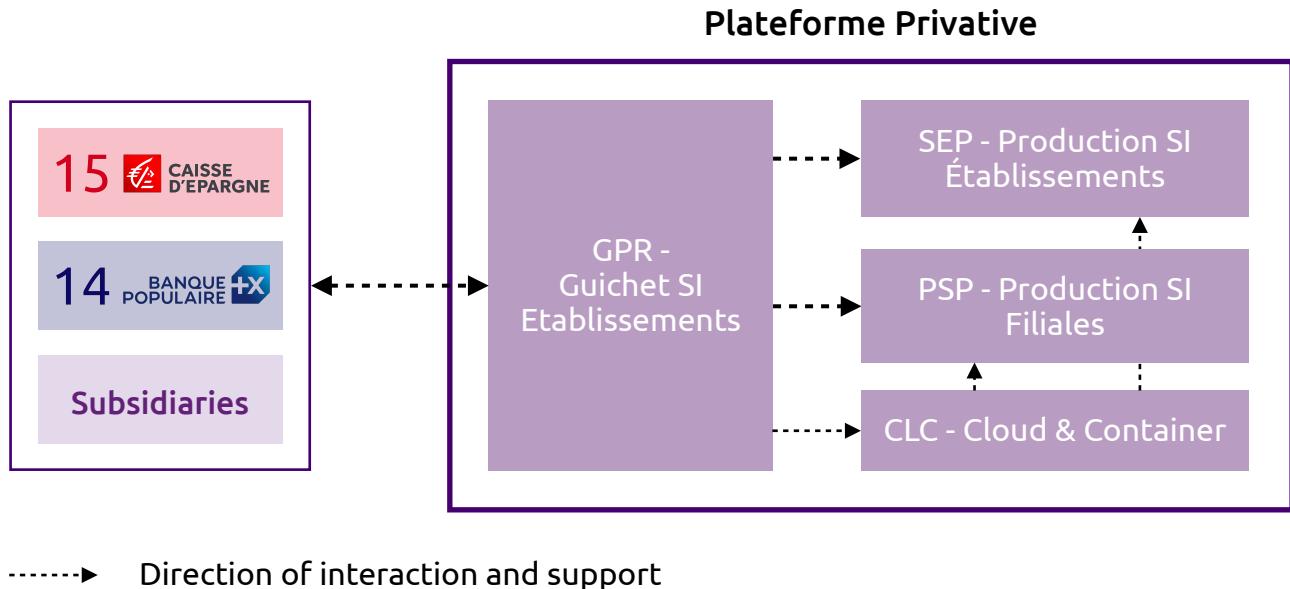
Scope and Functions

The PPR subdivision coordinates the setup, management, and deployment of websites and software, while reinforcing the digital infrastructure and application management for the Banques Populaires, Caisses d'Épargne, and subsidiaries. Our aim is to offload the establishments from the complexity of managing infrastructure and applications, centralise the group's IT resources, and ensure a controlled and efficient information system. While we don't create the applications, clients have the flexibility to have their digital platforms developed by BPCE SI, our group's dedicated software publishing arm, or choose external software publisher, with the understanding that they manage security compliance and software integrity.

Team Structure

The PPR subdivision is supported by four specialised sub-teams, each dedicated to a unique aspect of operations:

- **PSP - Production SI Filiales:** Focuses on managing the infrastructure needs for the subsidiaries.
- **SEP - Production SI Établissements:** Concentrates on infrastructure services for the Banques Populaires and Caisses d'Épargne.
- **GPR (Our Team):** Engages directly with banks and subsidiaries to gather and relay requirements to the PSP and SEP teams, while offering them (PSP & SEP) production support and use DevOps practices to accelerate delivery.
- **CLC - Cloud & Container:** Is a smaller team of two people who provide support to our team with cloud and container technologies.

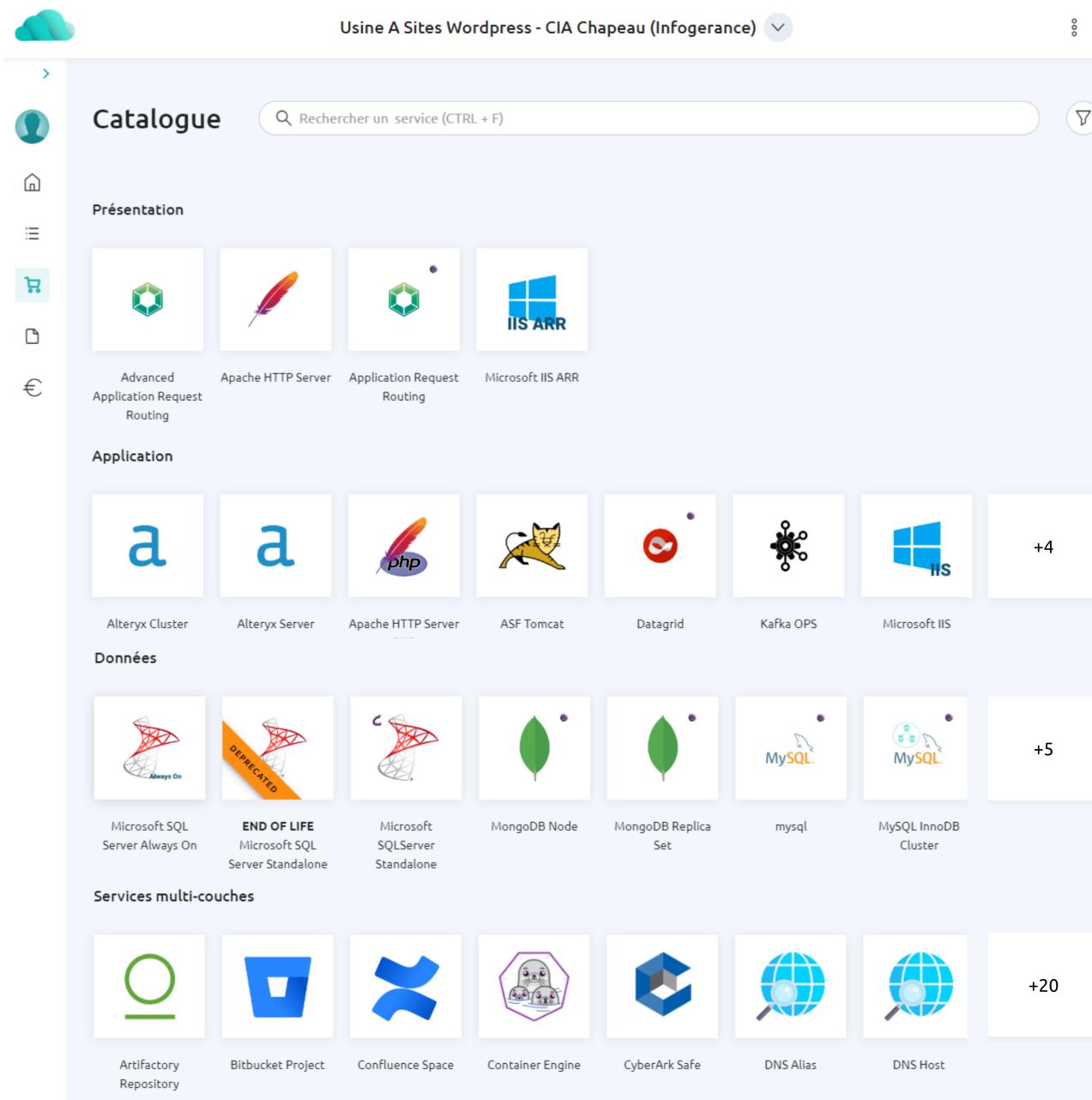
Organisational Structure of the PPR Division

.....→ Direction of interaction and support

Our division has had a steady growth since its creation in 2021. As of 2024, it has branched out to include three specialised teams, with discussions underway to further divide the SEP team. This highlights the division's significant contribution and value to the BPCE group.

MyCloud Solution

The infrastructure team has given us access to a platform they created called MyCloud, a private cloud service developed in collaboration with BPCE IT and Natixis. This platform provides a large catalogue of hosting and development solutions, facilitating self-service computing resources exclusively for our group's IT sectors.



The screenshot shows the MyCloud Solution interface, which is a private cloud service. At the top, there is a header bar with a cloud icon, the text "Usine A Sites Wordpress - CIA Chapeau (Infogérance)", and a dropdown arrow. Below the header, there is a sidebar with icons for user profile, home, and other settings. The main area is titled "Catalogue" and features a search bar with the placeholder "Rechercher un service (CTRL + F)".

The catalogue is organized into several sections:

- Présentation:** Includes icons for Advanced Application Request Routing, Apache HTTP Server, Application Request Routing, and Microsoft IIS ARR.
- Application:** Includes icons for Alteryx Cluster, Alteryx Server, Apache HTTP Server, ASF Tomcat, Datagrid, Kafka OPS, Microsoft IIS, and a "+4" button.
- Données:** Includes icons for Microsoft SQL Server Always On, Microsoft SQL Server Standalone (marked as DEPRECATED), Microsoft SQLServer Standalone, MongoDB Node, MongoDB Replica Set, mysql, MySQL InnoDB Cluster, and a "+5" button.
- Services multi-couches:** Includes icons for Artifactory Repository, Bitbucket Project, Confluence Space, Container Engine, CyberArk Safe, DNS Alias, DNS Host, and a "+20" button.

Service Offers

Our division provides two different offers:

- **Self-Service:** We give them access to MyCloud, and they are in charge of ordering and setting up their development, pre-production, and production environments.
- **Infogérance (Managed Services):** This package includes everything from setup to ongoing maintenance, ensuring systems are up-to-date and functioning smoothly.

• Organisation & work ethic

Meetings

In our organisation, the structure of small teams necessitates frequent meetings to ensure coordination across different departments. Every morning, the entire team of PPR gathers for a daily meeting via a Teams call as not everyone is on the same site. The primary agenda of these meetings is to assign establishment requests and incidents to the SEP team, addressing any potential problems, questions, or needs related DevOps pipelines. Besides these daily's, we have various other meetings focused on projects, training, sharing experiences, learning about new tools, and workshops.

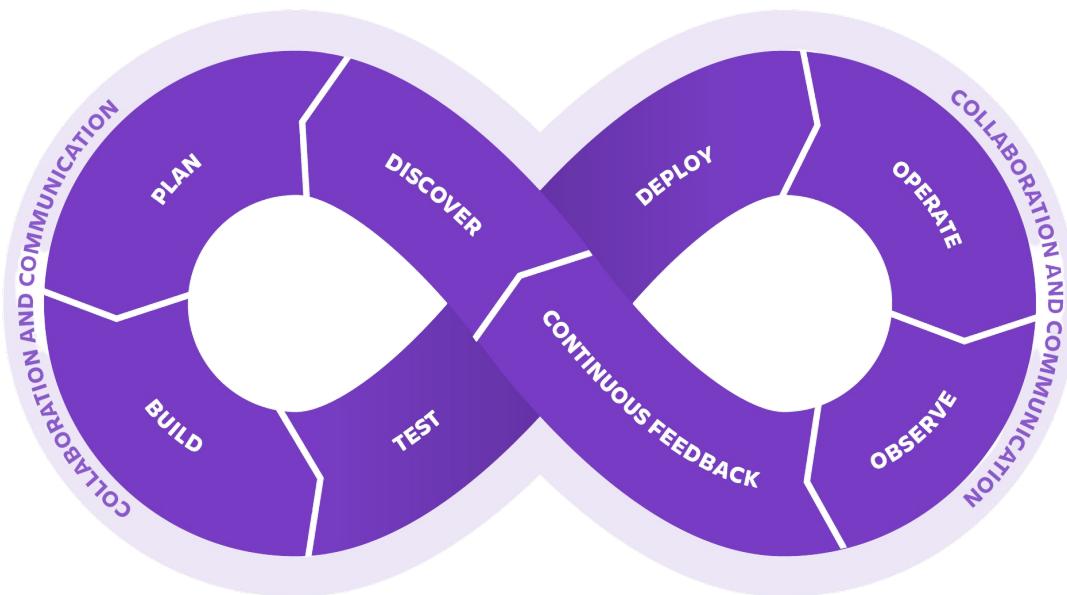
Some weeks are busier than others, there will be times where you'll feel submerged in meetings. Sometimes your week schedule will look like this !

lundi	mardi	mercredi	jeudi	vendredi
5	6 Anywhere - Sur site; Balma Bat E - 2 - DPM	7	8 Anywhere - Sur site; Balma Bat E - 2 - DPM	9
09:00 Daily PPR-GPR + PPR-SEP J	Daily PPR-GPR + PPR-SEP J	Daily PPR-GPR + PPR-SEP J	Annulé: Réunior Daily PF Annulé:	Brief de Réunior Annulé Réunior Daily PF
10:00 UAS - Daily meeting; Micro	UAS - Daily meeting; Micro	UAS - Daily meeting; Micro	UAS - Daily meeting; Micro	UAS - Daily mee Bilat H.V Réunior
11:00				SIT-RES007 Réunion Microsoft Teams
12:00				
13:00				
14:00 BPAURA - LRNET déploiement Réunion Microsoft Teams	Brief NAWEB; Réunion Micros transfer exercice part2 Microsoft Teams Meeting	HPR UAS Réunion Microsoft Teams	Formation Équipier Agile - Module 3 Réunion Microsoft Teams	Echanges équ Réunion Micro Again Openshift Réunion Microsoft Teams
15:00			Cycle de vie - Microsoft Tea	Annulé: Ann Réunion Micro
16:00 [Usine à Sites]: Compilation de BPAURA - LRNET CI/CD ; Réur		The return of the Openshift II - Revenge Réunion Microsoft Teams		
17:00				

Agile Transformation

One of the main goals of the company in 2024 is to have all teams transition to the agile methodology. Agile is a project management method that divides the work into small, manageable chunks, known as sprints, allowing for frequent reassessment and adaptation of plans. It is especially beneficial for teams working on development and operations. Given the nature of our tasks (ranging from handling incidents and updates to accommodating the always changing schedule of establishments), implementing agile is quite challenging.

To support our transition to agile, the company has organised training sessions to familiarise teams with the concept. A dedicated Agile Coach has been assigned to assist our team specifically, helping us adapt agile practices to suit our needs, offers guidance and answers our questions. This ensures a smoother transition to agile, aiming to improve our team's efficiency and adaptability to changing project requirements.



The diagram illustrates the Agile DevOps loop, which supports continuous software development and deployment. Our focus primarily lies on the Build, Test, Deploy, and partially on the Observe phases.

- A. **Build, Test, Deploy:** We build, test, and deploy client software and websites with custom release pipelines, using client feedback and needs.
- B. **Client Engagement:** Clients decides the timing of updates and take over operations after deployment. They provide feedback and new features that we then build, test, and deploy.
- C. **Observation Tools:** We include observation in our processes because our diagnostic tools detect and address errors, crashes, or downtime, ensuring rapid response to maintain performance.

The team's tools

During your time at BPCE-IT, you will be introduced to a many different tools essential to the workflow and operations within the team. These tools are used to increase collaboration, project management, and overall productivity.

Intranet BPCE IT

The Intranet is the central hub for all internal information related to the company. It has updates on current events, company documentation, statistics, product information, and team details. The BPCE Intranet is essential for staying informed about the company's internal dynamics.

Microsoft Teams & Outlook

These applications are the primary communication tools within BPCE-IT. They facilitate the scheduling of meetings on important topics, allow quick messaging, and sharing information across different teams and groups within the company. Additionally, you might hear about Yammer, it serves as the company's social network platform.

Jira

A project management tool that assists the team in organising, time-tracking, and distributing tasks. Jira is crucial in ensuring projects remain on track and team members are aware of their responsibilities and tasks.

Confluence

Acts as a collaborative content management workspace, functioning as the company's wiki. There are separate Confluence spaces for the team, the entire company, and, in some cases, individual projects that require a centralised repository of information.

Bitbucket

A tool used for source code management, facilitating collaboration on coding projects within the team. Works as our source of truth for configuration files and pipelines.

XLRelease & XLDeploy

XLR is used for coordinating software releases, automating the steps involved in creating a deployment package. XLD complements XLR by automating deployments across various environments, speeding up the deployment process.

Jenkins

This automation tool is crucial for our continuous integration (CI), automating various stages of the deployment process, including scripting, tests and creating deployment packages in the form of code in a Jenkinsfile.

Artifactory JFrog ARTIFACTORY

A solution for hosting, managing, and distributing software binaries and artifacts. It supports a wide range of software formats and is used for storing reusable templates, images, and other binary files.

CyberArk

A security tool that protects privileged accounts through advanced password management, ensuring that sensitive credentials are securely managed and stored.

All these tools are hosted on-premise, meaning they are operated within our own infrastructure. This setup provides us with better control over IT assets, including their performance, security, and physical location, without sharing data with external service providers.

While there are many other tools used by the team for different specific and sometimes personal use cases, the tools mentioned above are fundamental to the work that will be assigned to you. Familiarisation with additional tools will occur progressively throughout your time here.

Project Onboarding

This section serves as your guide to the range of projects I've been involved with throughout my internship, all of which you'll be taking on and advancing after my departure. Here, I'll provide a comprehensive overview of each project, including its context, the specific tools used, the current progress achieved, essential insights for seamless transition, and your objectives to maintain the project's ongoing progress and effectiveness.

Release template for Adequasys projects



Adequasys is a customisable and modular HR software widely adopted by many BPs and CEs within the group. It requires regular updates, such as the addition of new modules or the implementation of available upgrades. The SEP team has the responsibility of building and preparing these updated packages for deployment, ensuring that the banks can use the latest versions.

The number of Adequasys projects was increasing, eventually reaching up to 20 distinct projects, and were all managed separately. This approach necessitated manual setup for various components (XLR & XLD folders, Jenkins folders, Bitbucket, MyCloud, CyberArk, Artifactory), making the process inconvenient, time-consuming and prone to errors.

The goal was to create a more efficient continuous deployment (CD) chain that can autonomously initiate a new Adequasys project, provisioning the necessary services from MyCloud. For existing projects, the system would update the deployment template using a «true template», a template used as the source of truth.

Tools Used

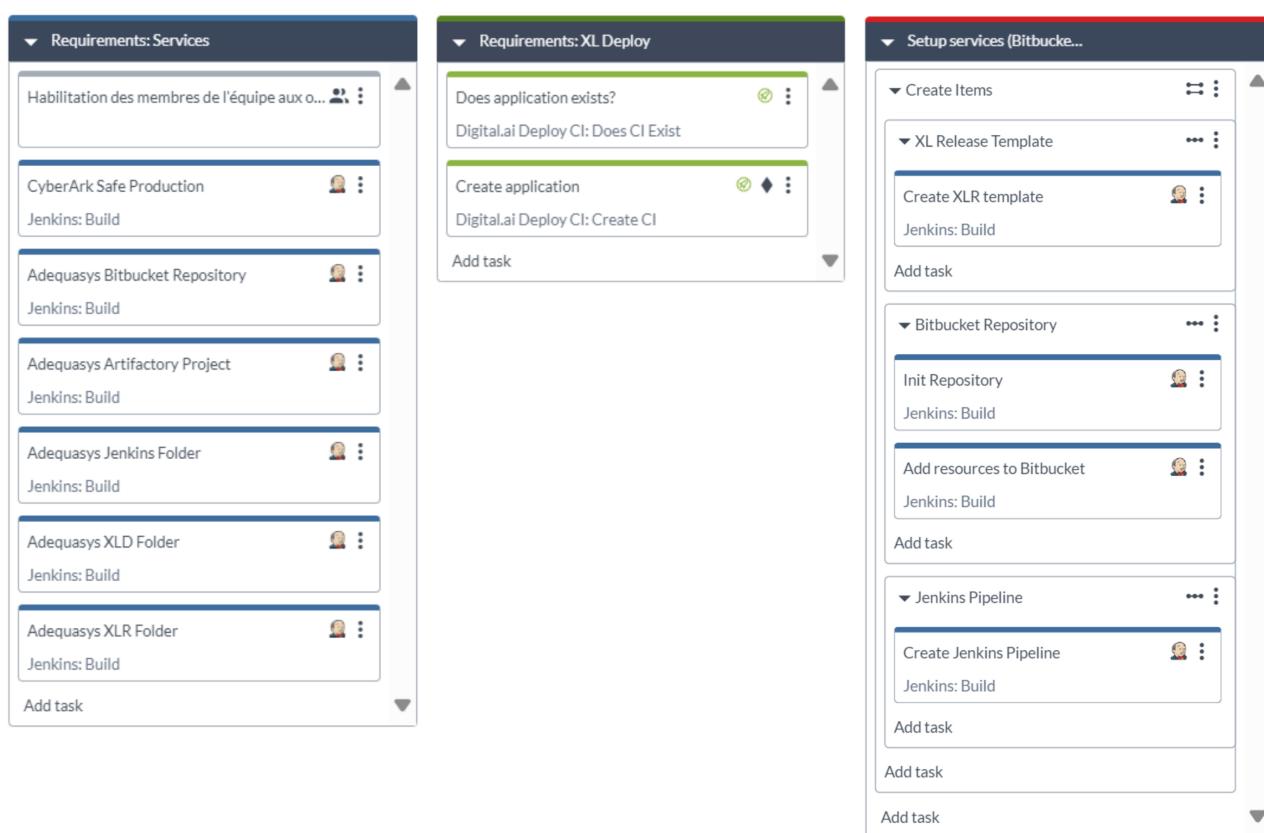
- **XLR**, to orchestrate and link the different steps
- **MyCloud**, to provision required services
- **Jenkins**, for pipelines and scripting
- **Artifactory**, for storing the «true template»
- **Bitbucket**, to store the repo template and pipelines

Pipeline Architecture

The objective was to create a release chain that would make things easier without starting from scratch or altering the 20 different folders we already use. This way, everyone can keep working as they're used to, and we can still make changes if a project needs something specific, like a new service or step in the CD chain.

The top level release chain uses a project code (CIA) to set up the required services from MyCloud and creates the XLD application and environment if they don't already exist. It also makes sure the right XLR and repository templates are used to keep everything standardised. This means everyone can keep working as they always have, going to their project folder to start deploying, but now there's also one place to manage or update all the projects' CD chains.

Below is the top level XLRelease Continuous Deployment pipeline that orchestrates the provisioning and template updates :



Stages

- **Requirements: Services & XL Deploy**

This phase ensures that all prerequisites for an Adequasys project are in place. By using the MyCloud API, the pipeline will send requests to its endpoints using the project's CIA code and order project folders for all of the required services such as Jenkins, Bitbucket, CyberArkSafe, Artifactory, XLR and XLD. If these services are already configured, the system intelligently skips this step to avoid redundancy.

• Setup Services

In this stage, we progress through three key steps, and each one has its own Jenkins pipeline:

1. **XLRelease Template:** The pipeline accesses a customisable XLR blueprint from Artifactory. It customises the template with the specific project details, and then, using the XLR [API](#), it puts this blueprint into the project's XLR folder.
2. **Bitbucket Repository:** This step uses a Jenkins pipeline to create a repository using the Bitbucket API, and then adds all the necessary resources to the repository such as XLD configuration files and a Jenkinsfile.
3. **Jenkins Pipeline:** The final step involves the Jenkins API creating a new pipeline using the Jenkinsfile stored in the Bitbucket repository, to orchestrate and automate the deployment process.

These three pipelines were made to be generic. This means that anyone in the team can reuse these pipelines for their CD pipelines.

Additional Information

Remember, it's crucial to keep the XLRelease and Bitbucket templates up to date since software, APIs, and project requirements are always changing. My experience with this project has taught me to be very rigorous, particularly due to the amount of time spent on testing and debugging. You shouldn't underestimate testing, as it is the most vital step when creating a release.

Keep in mind that your colleagues rely on your pipelines, and they have their own deadlines to meet. If they experience problems because the template wasn't tested properly, it doesn't just slow them down, it reflects on the whole team in the eyes of the BPs and CEs.

It's much more efficient to test as you go rather than trying to untangle issues long after you've finished a project. Trust me, jumping back into a project to debug something you left untested a month ago is time-consuming efforts you want to avoid. Always testing thoroughly will save you and your co-workers a lot of headaches down the line.

Website factory: UAS (Usine à Sites)

The Website Factory is a new, proprietary software solution launched by BPCE in mid-2023. This project addresses a longstanding issue within the group: the dispersal of various showcase websites across the BPs, CEs, and other subsidiaries. The Website Factory project aims to centralise all of the group's WordPress showcase websites onto a single platform. This consolidation ensures several key benefits:

- **Consistent Brand Image:** By using a uniform graphical charter, the project maintains a cohesive brand identity across all entities.
- **Reduced Infrastructure Costs:** Sharing infrastructure across different entities allows for cost savings on a group-wide scale.
- **Enhanced Security:** A centralised platform ensures that all websites benefit from uniform and robust security measures.
- **Community Building:** When one entity requests a specific feature, it can be made available to all, creating a sense of community and shared progress amongst the entities within the BPCE Group.

Previously, each BPCE entity managed their own website, which often resulted in a lack of uniformity.

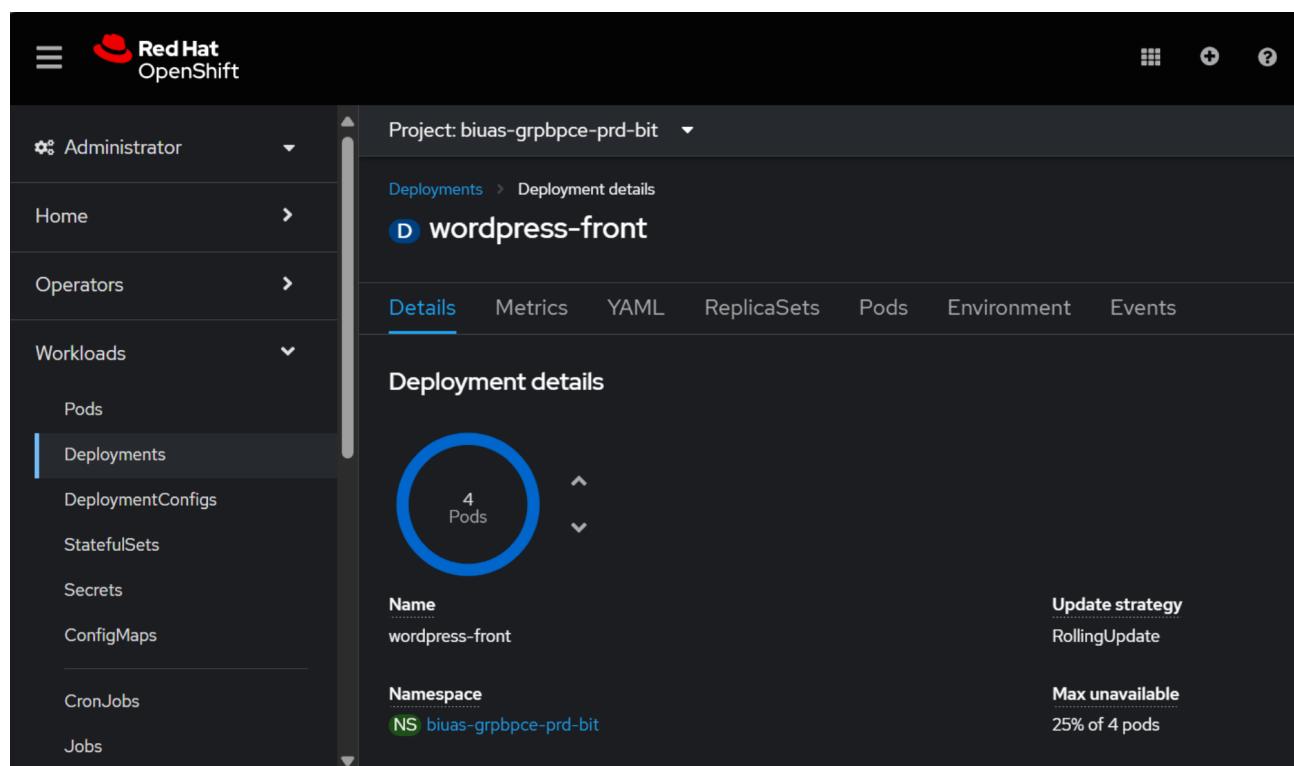
BPCE IT is in charge of the development of this solution, providing a platform where the "Webmasters" from each entity can customise their showcase websites using components developed by BPCE IT that comply with the group's design standards and security protocols.

This project brings together a team of approximately 35 people from around 10 different teams within the BPCE Group. The project's participants include a few specialised security teams responsible for areas such as cloud, container, applications, and networks, alongside the CESM, which is in charge of the security management for the group. Additionally, infrastructure teams dedicated to container technologies and architectural development, production teams such as our private platform team, and development teams, including the UAS team at BPCE SI.

Currently, the platform hosts fewer than 10 sites, but the long-term goal is to expand this to include 150 to 300 existing websites, along with new showcase sites from various group entities.

Tools & Technologies Used

- **MyCloud**, to provision required services (Load balancers, Nginx servers, InnoDB SQL Clusters, etc...)
- **Kubernetes**: an open-source system that automates the deployment, scaling, and management of application containers across host clusters. It supports infrastructure as code, promoting easy scalability and efficient management.
- **OpenShift**, a suite of containerisation software by Red Hat, OpenShift Container Platform is its main product. This hybrid cloud Platform as a Service (PaaS) uses Linux containers managed by Kubernetes on a Red Hat Enterprise Linux base, boosting security and stability. Here is what the administrator panel for the Groupe BPCE showcase website looks like:



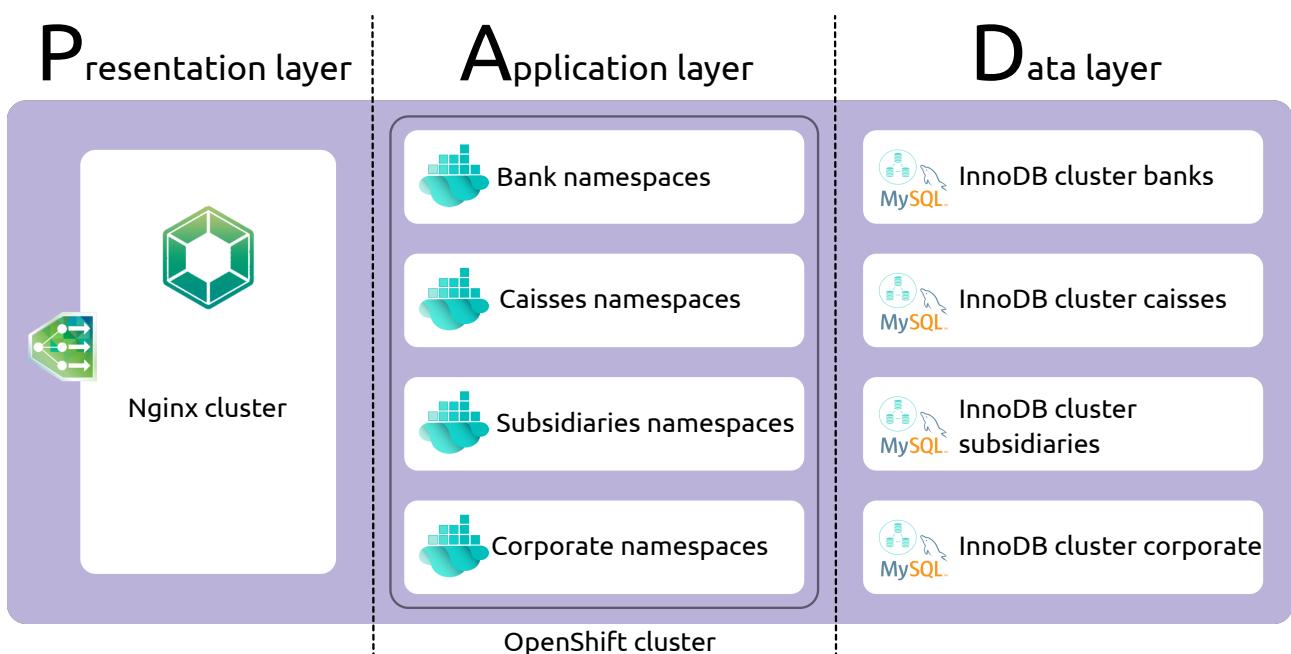
The screenshot shows the Red Hat OpenShift web interface. The left sidebar is titled "Administrator" and includes links for Home, Operators, Workloads (Pods, Deployments, DeploymentConfigs, StatefulSets, Secrets, ConfigMaps), CronJobs, and Jobs. The main content area is titled "Project: biuas-grpbpce-prd-bit" and shows the "Deployments" tab selected. A deployment named "wordpress-front" is listed. The "Details" tab is active, showing the following information:

Deployment details	
4 Pods	Update strategy
Name wordpress-front	RollingUpdate
Namespace NS biuas-grpbpce-prd-bit	Max unavailable 25% of 4 pods

- **Awazone**, a platform developed by BPCE IT, is essential for testing the interoperability of different web technologies before launch, ensuring reliable and robust online deployment.
- **Bitbucket**, to store all the Kubernetes and Nginx configuration files.

Project architecture

All projects developed by BPCE IT, including the Website Factory, have to adhere to the Three Layered Architecture, which organises an application into three distinct layers, each with a specific role. This structure ensures clean separation of concerns, enhancing maintainability, scalability, and security. Here's how each layer is implemented in the Website Factory project using MyCloud as the hosting infrastructure:



Presentation Layer (P)

- A load balancer and Nginx cluster, which manages web traffic, advanced routing, and caching. This layer efficiently delivers content to end users and handles dynamic content rendering.

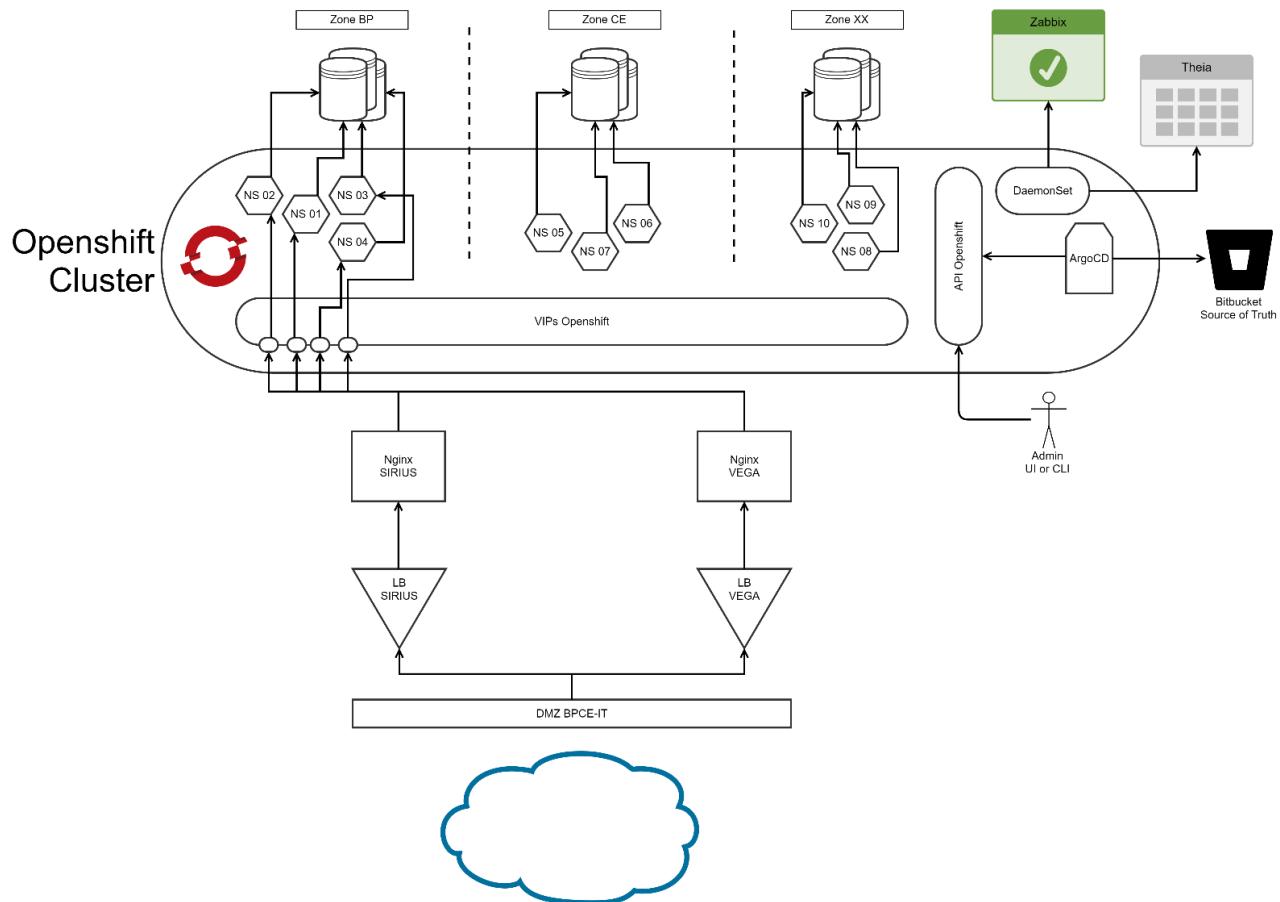
Application Layer (A)

- OpenShift Cluster: The application logic is deployed on an OpenShift cluster, which provides a robust, scalable environment for running containerised applications. This layer includes separate namespaces for different organisational entities like banks, caisses, subsidiaries, and corporate divisions. There is one namespace per environment per website, enabling tailored applications that meet the specific needs of each entity within the group.

Data Layer (D)

- MySQL InnoDB Clusters: Dedicated MySQL InnoDB clusters are deployed for different types of entities: banks, caisses, subsidiaries, and corporate sectors. Each cluster stores the data related to its respective entity, ensuring data integrity and efficient query processing. This configuration allows for high availability and robust data management capabilities, which are crucial for the performance and reliability of the websites hosted on the platform.

Here is a high level view of the full Website Factory architecture:



The BPCE Group operates two data centers, Vega and Sirius, which provide redundancy to ensure uninterrupted service availability. In the event of an incident like a fire or flood, one data center can take over from the other. This setup guarantees continuous operation and protects against potential disruptions.

Our Perimeter

The project was transitioned to our team in its early stages and the infrastructure/platform setup was not yet complete. We were tasked with finalising the infrastructure setup according to the specified architecture. After, our responsibilities included migrating sites to the new infrastructure, creating development, pre-production, and production environments, configuring Kubernetes settings, and restoring databases.

The BPCE Group's main site is hosted on the Website Factory platform to encourage other entities to transition to this platform. Given BPCE's role as an official partner of the 2024 Olympic Games, the site is expected to handle heavy traffic and potential cyber threats, necessitating flawless operation to uphold BPCE's reputation.

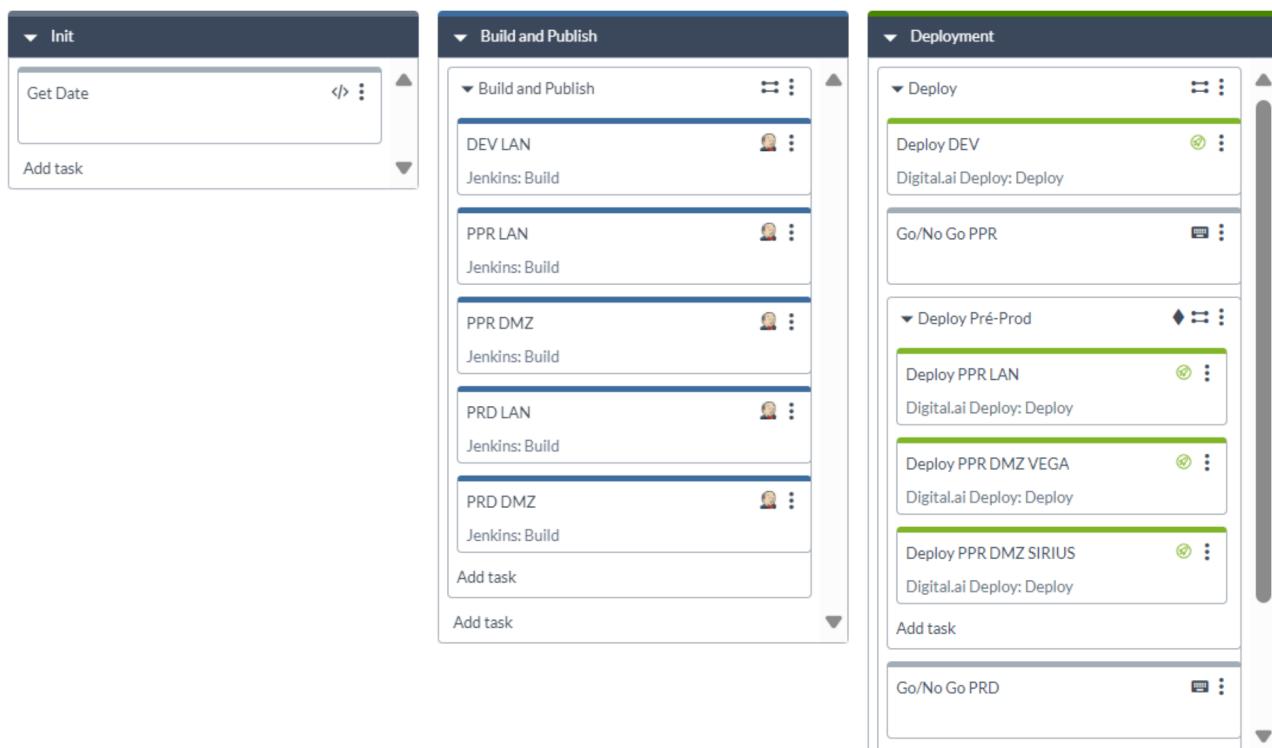
Our team is responsible for setting up environments for every new website joining the Website Factory, ensuring they are functional and operate correctly. Additionally, once a site is ready to go live, we initiate an Awazone request to validate the site and make it publicly accessible on the internet. We are also in charge of validating Pull Requests made to the UAS Kubernetes repository, making sure every change is justified, and applied to the correct environment/website.

Industrialisation of UAS

- **Updating Nginx servers**

Each website uses two Nginx configuration files across six different clusters: three internal (only accessible within the company's network): development, pre-production, and production and three external (available on the internet): one pre-production, and two production - one on Vega and another on Sirius). Previously, updating these servers involved updating the Bitbucket repository and then manually copying and pasting configurations across multiple Nginx servers, making it a tedious task.

To streamline this, I've implemented an XLRelease pipeline that triggers whenever there's a change to the configuration files in the UAS Nginx repository. It then starts a Jenkins job that packages the required files for each server, stores them on Artifactory and then, through XLDeploy, automatically updates the Nginx servers with the correct configurations by retrieving them from Artifactory. This solution not only saves time but also reduces the potential for human error.



- **Updating website configuration**

To simplify updates across multiple websites, I created a script that helps manage updates to Kubernetes configuration files efficiently, which would otherwise be a slow process if done site-by-site.

When run from the repository's folder, the script updates selected environments and can exclude certain folders as needed. It generates configuration files without applying them, allowing for a final check to avoid errors. If required, adding an 'apply' argument makes the script automatically update all the websites. This method saves time and ensures accuracy in updates.

Additional Information

During my time here, I've put together a lot of extensive documentation on the different subjects surrounding the UAS project. I encourage you to read these resources as they'll guide you through most tasks you'll handle with the UAS. It's worth noting that you might still encounter some new errors that aren't covered.

This project has tight deadlines because our clients often need quick updates to their environments. Given my own experiences, I can tell you that it's pretty easy to slip up with Kubernetes configurations. To keep mistakes to a minimum, always double-check your configurations and have your changes reviewed through pull requests before you apply them. This step is crucial for keeping things smooth and error-free.

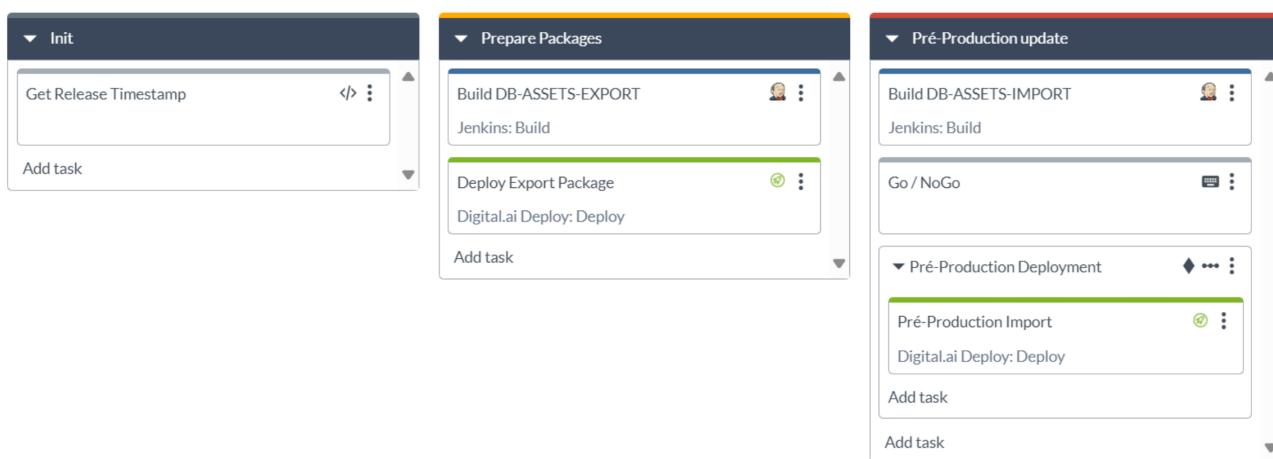
Release pipelines for various agencies

Alongside the major Website Factory project, I also tackled several smaller projects. These didn't take much time (usually about a week or two each) and came from various agencies. Managing multiple projects at once is pretty common in the team, and even though these were less time-consuming, they're worth mentioning. They show the range of projects we work on and the variety of tasks we handle, giving a full picture of our day-to-day work.

Caisse D'Épargne Hauts De France (CEHDF)

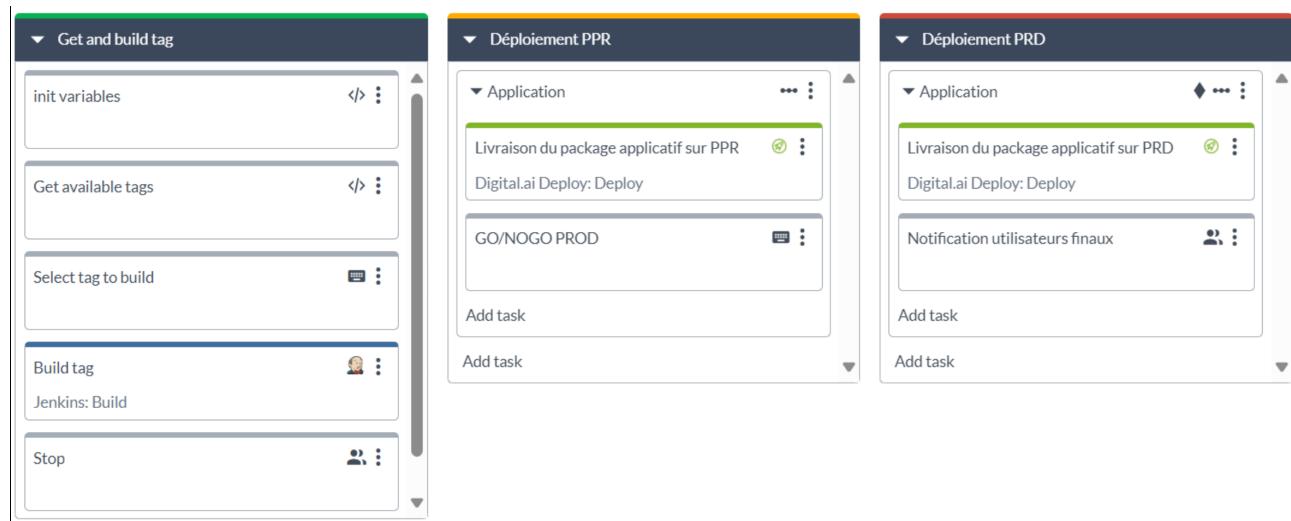
This agency required a pipeline to synchronise their pre-production database with the production database to ensure data consistency across both environments. The pipeline is structured into three main stages:

- **Timestamp Acquisition:** This initial stage captures a timestamp that is used to tag files, facilitating easy identification and retrieval during later stages of the pipeline.
- **Export:** In this stage, a package containing two shell scripts is created; one script is for exporting the database, and the other for exporting assets. Both scripts include the timestamp and are pushed to Artifactory. They are then deployed and executed on the production server.
- **Import:** This final stage mirrors the export process. It packages two shell scripts designed to restore the pre-production database and assets using the earlier packaged files from Artifactory. These scripts are deployed and executed on the pre-production server, effectively updating and mirroring the two environments.



Banque Populaire Grand Ouest (BPGO)

For this agency, I developed a release pipeline designed to deploy one of their three websites at a time. The pipeline begins by selecting which website to deploy, retrieves the corresponding package from Artifactory based on its tag, and then proceeds to deploy it on both pre-production and production servers.



Section 2: Request for Project Participation

Project Proposal for the Jenkins Shared Library Development

As my internship at BPCE-IT comes to an end, I am eager to keep advancing innovation here, specifically by leading the development of a Jenkins Shared Library. The objective of this initiative is to enhance our pipeline development processes, ensuring efficiency and consistency across the board.

Context and Justification

Throughout my internship, I've worked on a number of projects using Jenkins for continuous deployment during my internship, including the Website Factory project and the release template for Adequasys projects. These experiences have brought my attention to the ongoing need for reusable code segments in order to accelerate the pipeline development procedure. Currently, each project team often rewrites or copies code, which is inefficient and susceptible to errors.

The Jenkins Shared Library

The proposed Jenkins Shared Library would centralise reusable pieces of code, making it easier and faster for the team to develop new pipelines. This library would act as a repository of standardised code snippets that can be easily imported into project-specific Jenkinsfiles. By encouraging reusable code, we can increase development speed and lower the risk of bugs and errors, thereby improving overall project quality.

Advantages

- **Efficiency:** Significantly reduces the time spent on writing and testing new code for each project pipeline.
- **Consistency:** Ensures all pipelines follow the same standards and practices, improving maintainability.
- **Scalability:** New requirements can be integrated into the library and made available for all projects, supporting the continuous evolution of our deployment practices.
- **Knowledge Sharing:** Encourages a culture of collaboration and learning, as team members contribute to and use the shared resources.

Alignment with BPCE-IT Goals

This project directly aligns with BPCE-IT's objectives of enhancing service quality and operational efficiency. It also supports our cybersecurity measures by ensuring that the pipelines are robust and standardised.

Personal Contribution and Development

During my internship, I have developed a deep understanding of Jenkins and the complexity of pipeline configurations, demonstrated by my successful management of the release pipelines for various projects. My ability to search for answers, solve problems, and my keen attention to detail have helped me in previous projects assigned to me, and these qualities will be very important in leading the Jenkins Shared Library project.

Conclusion

Allowing me to lead the Jenkins Shared Library project would not only leverage my existing skills and experiences gained during the internship, but would also help us achieve our common aim of technological excellence and efficiency at BPCE-IT. I am excited about this project's potential impacts and want to contribute to its success.

I kindly ask for your support in approving my participation in this project. With your support, I am confident that we can make a significant advancement in our IT operations.

Looking forward to your favourable consideration and ready to discuss this proposal further at your convenience.

**Harry Viennot,
DevOps Engineer intern**

My Internship Conclusion: A Personal Perspective

My internship at the bank has been an incredibly enriching experience, teaching me a lot about the banking sector and the inner workings of the organization. Before starting, I had no idea how the group was divided and organized, but now I have a solid understanding of its structure and operations. This internship has been very interesting, constantly exposing me to different subjects and expanding my knowledge.

I had the privilege of working with a great team that was always open and attentive. They helped me whenever I needed it, and I also felt that my contributions were valued. Knowing that the work I do here will be used after I leave adds a sense of importance to my role. While my impact on the company as a whole might be small, I believe I made a significant difference to my team.

Throughout this internship, I have gained professional maturity, learning new tools and practices that will be beneficial in my future career. I have also developed new skills that I can take with me. Overall, this internship has been a highly valuable experience, both professionally and personally, and I am grateful for the opportunity to have been part of this team.