



SAP BTP Developer's Guide

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SAP Business Technology Platform (SAP BTP) | Cloud

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What Is SAP BTP Developer's Guide?

Learn about the SAP BTP Developer's Guide and how you can use it to improve the process of implementing a business application on SAP BTP.

Overview

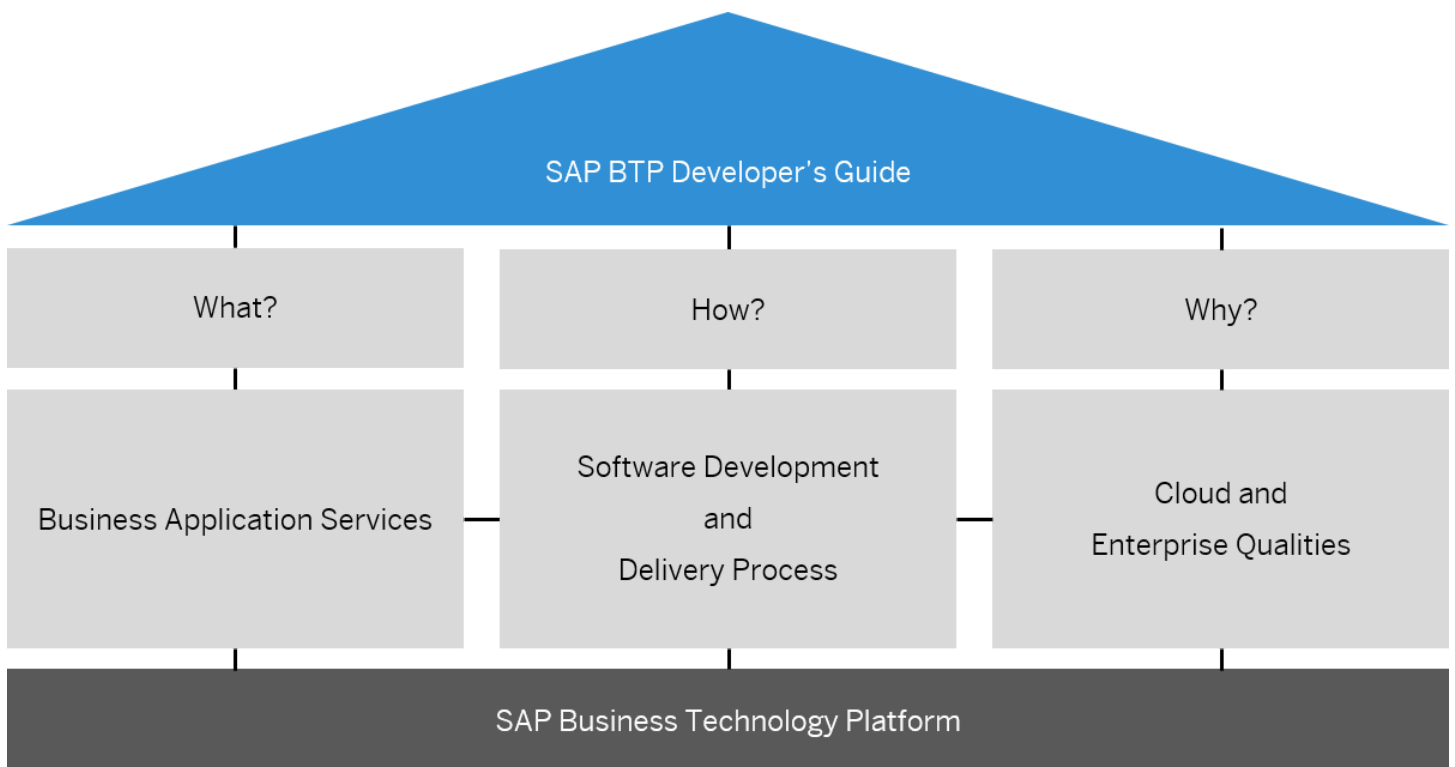
The goal of the SAP BTP Developer's Guide is to help you implement business applications on SAP BTP. This guide explains the building blocks for developing, delivering, and integrating business applications.

Development projects for business applications have similar characteristics. Standardized development guidance is driving developer efficiency.

Based on the experiences of successful business applications, this guide condenses best practices and technologies that can be safely recommended to you. These recommendations include:

- A blueprint with a curated list of services that implement the standard nucleus of SAP business applications on SAP BTP.
- An automated SAP BTP Infrastructure setup that handles provisioning, management, and configuration of resources on SAP BTP.
- A standard set of technologies that ensure smooth integrations.
- Guidance for delivering SAP cloud qualities and intelligent enterprise suite qualities.

The SAP BTP Developer's Guide recommends the ABAP Cloud and SAP Cloud Application Programming Model (CAP) as the best architecture styles to implement for business applications. Both programming models integrate with SAP BTP services.



The SAP BTP Developer's Guide complements existing documentation, such as the Best Practices for SAP BTP guide, by providing guidance concerning the recommended process to implement business applications on SAP BTP, especially for developers. See [Best Practices for SAP BTP](#).

Another resource is the SAP BTP Guidance Framework - this is the central access point for architects, developers, and administrators to build and run enterprise-grade solutions on SAP BTP. It comprises decision guides, reference architectures, methodologies, recommendations, and DevOps principles. See [SAP BTP Guidance Framework](#).

ABAP Cloud

ABAP Cloud reflects the modern way to develop ABAP. It allows you to build lifecycle-stable and cloud-ready business applications, services, and extensions.

ABAP Cloud provides tools and techniques that ensure cloud qualities, promotes new technologies, contains a cloud-optimized subset of the ABAP language, and makes upgrade cycles easier by a clear separation between custom code and SAP code by only using released APIs and objects.

SAP Cloud Application Programming Model

The SAP Cloud Application Programming Model (CAP) is a framework of languages, libraries, and tools for building enterprise-grade services and applications. It supports Java (with Spring Boot), JavaScript, and TypeScript (with Node.js), which are some of the most widely adopted languages. CAP guides developers along a path of proven best practices and a great wealth of out-of-the-box solutions to recurring tasks.

CAP-based projects benefit from a primary focus on the domain. Instead of delving into overly technical disciplines, CAP focuses on accelerated development and safeguarding investments in a world of rapidly changing cloud technologies.

Here are some of the benefits that come with the SAP Cloud Application Programming Model (CAP):

- Built-in best practices
- Support for Visual Studio Code and SAP Business Application Studio tools
- Safeguarded application development investments
- No runtimes lock-in
- Reuse and integration of SAP BTP application services
- Latest UX and themes

SAP Build Code

SAP Build Code offers an AI-powered cloud development environment specifically tailored for SAP Cloud Application Programming Model (CAP) and SAPUI5 developers and supporting JavaScript, TypeScript and Java.

By seamlessly integrating coding, testing, and application management, it streamlines the application development process on SAP BTP. SAP Build Code combines SAP Business Application Studio with the most essential services and SDKs on SAP BTP.

With the integration of Joule, the innovative AI copilot of SAP, SAP Build Code enables automatic generation of application code, data models, services, and sample data.

Using SAP Build Code ensures adherence to the best practices and guidance outlined in the SAP BTP Developer's Guide.

Contribute to the SAP BTP Developer's Guide



→ **Tip**

The English version of this guide is open for contributions and feedback using GitHub. This allows you to get in contact with responsible authors of SAP Help Portal pages and the development team to discuss documentation-related issues. To contribute to this guide, or to provide feedback, choose the corresponding option on SAP Help Portal:

- [Feedback](#) > [Create issue](#) : Provide feedback about a documentation page. This option opens an issue on GitHub.
- [Feedback](#) > [Edit page](#) : Contribute to a documentation page. This option opens a pull request on GitHub.

You need a GitHub account to use these options.


More information:


- [Contribution Guidelines](#)
- [Introduction Video](#) 
- [Introduction Blog Post](#) 

What's New for SAP BTP Developer's Guide

2024

Technical Component	Environment	Title	Description	Action	Lifecycle	Type	Line of Business	Modular Business Process
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Technical Component	Environment	Title	Description	Action	Lifecycle	Type	Line of Business	Modular Business Process
SAP BTP Developer's Guide	Kyma Cloud Foundry	Explore the Develop a Side-by-Side CAP-Based Extension Application Following the SAP BTP Developer's Guide Mission	<p>There is a new mission published that is part of the hands-on materials for the SAP Cloud Application Programming Model (CAP).</p> <p>The mission explains how you can implement side-by-side SAP Cloud Application Programming Model (CAP)-based extension applications and deploy them in SAP BTP and is based on the Incident Management sample application.</p> <p>See:</p> <ul style="list-style-type: none">• Tutorials for SAP Cloud Application Programming Model• Mission: Develop a Side-by-Side CAP-Based Extension Application Following the SAP BTP Developer's Guide 	Info only	General Availability	Announcement	Technology	Not applicable

Technical Component	Environment	Title	Description	Action	Lifecycle	Type	Line of Business	Modular Business Process
SAP BTP Developer's Guide	Kyma Cloud Foundry	Explore the Implement Observability in a Full-Stack CAP Application Following SAP BTP Developer's Guide Mission	<p>There is a new mission published that is part of the hands-on materials for the SAP Cloud Application Programming Model (CAP).</p> <p>The mission explains how you can add observability to your SAP Cloud Application Programming Model (CAP)-based applications and is based on the Incident Management sample application.</p> <p>See:</p> <ul style="list-style-type: none">• Tutorials for SAP Cloud Application Programming Model• Mission: Implement Observability in a Full-Stack CAP Application Following SAP BTP Developer's Guide 	Info only	General Availability	Announcement	Technology	Not applicable

Technical Component	Environment	Title	Description	Action	Lifecycle	Type	Line of Business	Modular Business Process
SAP BTP Developer's Guide	ABAP	Explore the Develop a Full-Stack RAP Application Following the SAP BTP Developer's Guide Mission	<p>There is a new mission published that is part of the hands-on materials for ABAP Cloud: Develop a Full-Stack RAP Application Following the SAP BTP Developer's Guide. It is based on the Travel sample application of the Flight Reference Scenario ➦ that is the best practice example for developing, deploying, and operating a full-stack application using ABAP RESTful Application Programming Model (RAP) and SAP Fiori.</p> <p>See Tutorials for ABAP Cloud.</p>	Info only	General Availability	Announcement	Technology	Not applicable

Technical Component	Environment	Title	Description	Action	Lifecycle	Type	Line of Business	Modular Business Process
SAP BTP Developer's Guide	ABAP Kyma Cloud Foundry	Build Your Application from Concept to Code	<p>The SAP BTP Developer's Guide now provides insights on how to deliver a cloud application from concept to a final product. The section From Concept to Code outlines a progressive approach that includes the following steps:</p> <ul style="list-style-type: none"> • Identify the business problem • Deliver a cloud application from concept to a final product • Understand modularization in general • Understand modularization in the context of microservice-based architecture • Learn why the domain-driven design is an adequate approach • Learn about the domain-driven design starter modeling process • Check how complex your scenario is <p>For more information, see From Concept to Code.</p>	Info only	General Availability	Announcement	Technology	Not applicable

Development Use Cases

Typical Development Use Case Patterns

The following use case patterns should always be implemented on the SAP BTP:

- Automate processes across backend systems

This pattern provides low code/no code capabilities to automate processes and is meant for business experts and developers.

- Build web and mobile applications

This pattern provides mobile-native and web development capabilities and is meant for business experts and developers.

- Develop full-stack applications

This pattern is meant for professional developers and has the following flavors:

- Full-stack single-tenant applications

This pattern is meant for customers and implementation partners enabling them to develop full-stack applications on SAP BTP.

- Full-stack multitenant SaaS applications for partners that are independent software vendors

This pattern is meant for SAP partners enabling them to develop full-stack SaaS applications on the SAP BTP and to distribute these applications to their customers. Partners can easily onboard multiple customers (tenants) onto a single application with strictly separated data. This approach dramatically reduces the total cost of ownership at cloud scale.

- Hub scenario integrating with several ERP systems and/or cloud services

This pattern provides a central hub on SAP BTP to collect and distribute data from various systems.


Extensibility Options

Most development use cases address some sort of extension of SAP S/4HANA and SAP S/4HANA Cloud, public or private edition. Depending on the nature of the extension, different extensibility options are available. The extensibility options can be roughly divided into two categories:

- On-stack extensibility

A group of extensibility options that allows users to directly extend the software stack without any remote connection. The extensibility options are:

- Key user extensibility
- Developer extensibility
- Classic extensibility: not recommended; it's available only in private cloud and on-premise setups.

For detailed explanation of the ABAP on-stack extensibility options, see [Extend SAP S/4HANA in the Cloud and On-Premise with ABAP-Based Extensions](#) .

In this document, you can also find decision tables when to use which extensibility option and how to combine these options in more complex scenarios.

- Side-by-side extensibility

An extensibility option that allows developers or key users to implement development projects, such as creating custom user interfaces or custom applications. The development projects are implemented on SAP BTP and integrated via released remote APIs.

Building Transactional, Analytical Applications and Integration Scenarios with ABAP Cloud

ABAP Cloud offers developers a programming model to design and implement transactional applications, analytical applications, and integration scenarios. Applications can be deployed as single tenant or multitenant SaaS applications.

ABAP Cloud defines the technological core of the ABAP Cloud development model and consists of technologies such as ABAP, ABAP RESTful Application Programming Model (RAP) and Core Data Services, reuse services and libraries to implement the programming model aspects. Built-in qualities define the common quality characteristics that all ABAP Cloud implementations fulfil such as extensibility or identity and access management.

From Concept to Code

Before starting to implement an application on SAP BTP, it's better if you do some planning and research beforehand.

Identify the Business Problem

A business problem represents a gap between the desired and actual outcome of a task. It can be any hurdle, situation, or variation that prevents a business from achieving its objectives. A business problem may not have an immediately obvious resolution, and may be masked or hidden by perception and assumption. To define a true problem, you need to remove the factors that obscure the real reason behind the problem.

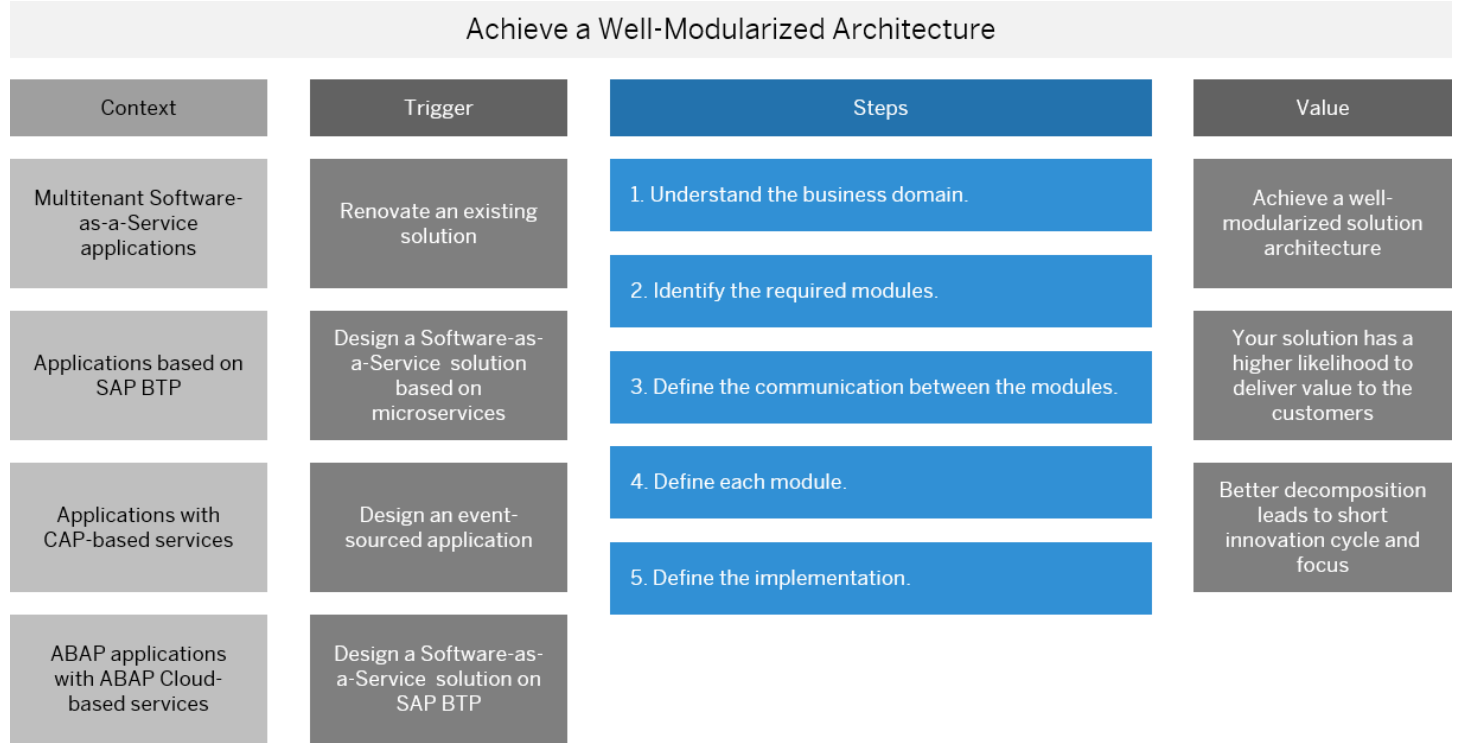
To solve a problem for an internal or an external customer when using a product, you need to ask questions that can help you understand the customer's needs, expectations, pain points, and feedback. Some examples of such questions are:

- What are the tasks that customers are trying to achieve with a product?
- How do the customers use the product in their daily workflow?
- What are the main challenges or frustrations that the customers face when the product?
- How can you improve the product to better serve the customers' needs?
- How satisfied are the customers with the product and the customer service?
- What are the benefits or value that the customers get from the product?
- How do the customers measure the success or impact of the product on their goals?

Deliver a Cloud Application from Concept to a Final Product

The columns in the following graphic show for which use cases using a well-modularized architecture suits best, what is the motivation, the steps and the benefits.

This image is interactive. Hover over the image and click the highlighted areas so you are placed in the respective cell in the table.



Please note that image maps are not interactive in PDF output.

Context

Let's assume the following scenario: you and your team are tasked to deliver a multitenant application on SAP BTP or SAP S/4HANA Cloud Public Edition and you want to base the application either on SAP Cloud Application Programming Model (CAP) or on ABAP Cloud.

Trigger

Use the following triggers as a motivation to engage in sophisticated design process:

- Renovating, evolving or reimplementing an existing solution

This involves transforming a legacy system into a modern, more efficient and scalable solution. Legacy systems often pose difficulties in terms of maintainability, integration with newer technologies, and can be a bottleneck for a business's growth. This transformation process could involve refactoring code, adopting new architecture patterns like microservices, or completely reimplementing the software with a new technology stack.
- Designing a new Software-as-a-Service solution based on microservices

Software-as-a-Service is a model where software is provided over the internet on a subscription basis. When designing a new Software-as-a-Service solution based on microservices, the system is decomposed into a collection of services that are independently deployable, scalable, and can be developed by different teams. Each microservice corresponds to a specific business capability and can be developed, deployed and scaled independently. This architectural style promotes flexibility and scalability, and it can speed up the development process by enabling parallel development across teams. It's important to design these services around the business capabilities.
- Considering more asynchronous behavior and event-sourced applications

Asynchronous behavior in an application refers to operations that can be executed independently and don't block the flow of the program. This makes the application more responsive and can improve system-wide performance. Event sourcing is an architectural pattern that stores changes to the application state as a sequence of events, rather than just storing the current state. This can provide a full audit trail, simplify debugging by allowing the state of an application at any point in time to be recreated, and can facilitate asynchronous, message-driven architectures. By integrating these into the system, it can enhance the system's scalability and reliability.
- Designing a Software-as-a-Service application on SAP BTP

When designing a Software-as-a-Service application on SAP BTP, the application is built to be delivered over the internet and leverages the services provided by SAP BTP. This can include data storage services, AI and machine learning capabilities, analytics and more. Using such a platform can speed up development time, as many of the underlying infrastructure considerations and services are taken care of by the platform.

Steps

Follow these steps to ensure smooth implementation of your application:

1. Understand the business domain.

Understanding the business domain is of the utmost importance. The business domain refers to the area of expertise or business that a software solution is intended to support. This understanding includes the business's processes, rules, norms, and intrinsic challenges. This knowledge forms the basis of the model that the software will encapsulate. Developers should work closely with domain experts to ensure that the software accurately reflects the real-world domain, with all its complexity and nuance. A thorough understanding of the business domain will help in creating software that is useful, flexible, and capable of evolving alongside the business.

2. Identify the required modules.

Identifying the required modules means breaking down the overall system into smaller, manageable, and functionally cohesive units. Each module is designed to encapsulate a specific portion of the domain model and is typically aligned with a specific sub-domain or business capability. By identifying the modules, developers can ensure separation of concerns and make the system more maintainable. Each module should be able to operate independently, reducing dependencies and allowing for parallel development and easier testing.

3. Define the communication between the modules.

Once the modules are identified, the next step is to define how they will interact with each other. This involves establishing interfaces, contracts, or APIs for communication. This is often guided by the concept of context mapping, which helps to define the relationships and interactions between different related contexts. Communication between modules should be carefully managed to preserve the autonomy of the modules. The communication could be synchronous or asynchronous, and could be based on various patterns like request/response, events, or commands.

4. Plan the implementation.

After you have an understanding of the business domain, have identified the required modules, and defined how they will communicate, the next step is to plan the implementation. This is the moment where you decide which technologies, patterns, and practices to use to build each module. This can include selecting the programming languages, databases, message brokers, and other tools that will be used. It also involves choosing the architectural patterns (like layered architecture, hexagonal architecture, or microservices) and design patterns that will be applied. The implementation should be guided by the principles of the domain model, encapsulating the business logic in entities, value objects, aggregates, and domain events. Additionally, the implementation should consider non-functional requirements like scalability, performance, security, and maintainability.

Value

If you follow the steps mentioned in the previous section, you will achieve the following benefits:

- Well-modularized architecture.

In the context of software development, a well-modularized architecture refers to the design of a system where the different functionalities and responsibilities are partitioned into distinct modules. Each module encapsulates a specific subset of the system's behavior and can be developed, tested, and maintained independently of the others. Modules are often designed to be loosely coupled, meaning that they interact with each other through well-defined interfaces, but their internals are hidden from each other. This encapsulation increases the maintainability of the system because changes inside one module don't impact the others. It also improves the scalability of the system, as individual modules can be scaled up or down based on their individual requirements. Finally, modularization can increase the speed of

development because different teams can work on different modules at the same time without interfering with each other.

- Higher likelihood to delivery value to your customers.

The focus is on understanding the business domain and creating a software model that reflects and serves that domain. By aligning the software closely with the business needs, there's a higher likelihood of delivering value to the customer. This comes from a deep understanding of the business, its rules, and its needs. This understanding guides the software development process, ensuring that the software solves the right problems and provides the features that the business actually needs. As a result, the software is more likely to be valuable to the end users, who are the ones interacting with the business domain on a daily basis.

- Better decomposition that would lead to shorter innovation cycles and clearer focus.

Decomposition in software design is the process of breaking down a complex system into smaller, manageable parts or components. Better decomposition, often achieved through practices like domain-driven design and microservices architecture, allows for clearer focus on individual parts of the system and can lead to shorter innovation cycles. With a well-decomposed system, teams can focus on specific components or services, understand them thoroughly, and make improvements or innovations without having to understand the entire system. This can significantly shorten the time it takes to go from an idea to a working feature, because changes are localized to specific parts of the system and don't require broad, system-wide understanding or modifications. Moreover, better decomposition can lead to clearer focus because each component or service can be designed around a specific business capability or domain concept. This allows the team working on that component to focus on the specific business problems and user needs related to that capability or concept, rather than being distracted by other parts of the system. This kind of focus can lead to better solutions and more valuable software.

Understand Modularization in General

Modularization is a general programming concept where you separate program functions into independent pieces, called modules. These modules then act like building blocks, with each block containing all the necessary parts to execute a piece of the functionality. When the modules are put together, they make up the executable program.

A modular code is:

- **Easier to maintain**

It's easier to read, understand, debug, and modify code that is modularized. It also reduces the risk of introducing errors or conflicts when changing or adding new features. A good modularization also enables reuse of existing modules across different products, which saves time and effort.

- **Easier to test**

Each module can be tested individually and independently from the rest of the system. This also facilitates automated testing and continuous integration, which improve the quality and reliability of the software product.

- **Easier to scale**

Each module can be deployed, updated, or replaced separately, without affecting the whole system. This also allows for parallel development and faster delivery of new features or bug fixes. A good modularization also supports distributed and cloud-based architectures, which enhance the performance and availability of the software product.

- **More reliable**

Each module has a clear and well-defined interface and responsibility. This also reduces the coupling and dependency between modules, which minimizes the impact of failures or errors in one module on the rest of the system. A good modularization also enables fault tolerance and recovery mechanisms, which improve the resilience and robustness of the software product.

- **More adaptable**

Each module can be easily modified or extended to meet changing requirements or customer needs. This also increases the flexibility and diversity of the software product, as different modules can be combined or configured in various ways.

- **Easier to evolve**

Each module can be evolved independently or collaboratively, without affecting the overall functionality. This also promotes innovation and creativity, as new modules can be created or reused to generate novel solutions or features.

Understand Modularization in the Context of Microservice-Based Architecture

The right modularization is very important in the context of microservices, because microservices are essentially a form of modular software development. Microservices aim to create small, focused, and independent services that communicate through well-defined interfaces and protocols. Each service is responsible for a specific functionality or domain, and can be developed, deployed, and scaled independently from other services. This way, microservices enable a high degree of modularity, flexibility, and agility in software development.

However, not all modularizations are equally effective or beneficial for microservices. A poor modularization can lead to problems such as:

- **High coupling and low cohesion**

If the services are not well-defined and separated, they may depend on each other too much, or have too many responsibilities. This can result in tight coupling between services, which makes them hard to change, test, or reuse. It can also result in low cohesion within services, which makes them complex, inconsistent, or redundant. High coupling and low cohesion reduce the maintainability, testability, and reliability of microservices.

- **Service sprawl and fragmentation**

If the services are too fine-grained and numerous, they may become difficult to manage, monitor, and coordinate. This can result in service sprawl, which increases the operational complexity and overhead of microservices. It can also result in service fragmentation, which reduces the performance and availability of microservices. Service sprawl and fragmentation reduce the scalability and adaptability of microservices.

- **Lack of alignment and consistency**

If the services are not aligned with the business domain and goals, they may not deliver the expected value or quality. This can result in lack of alignment, which reduces the relevance and effectiveness of microservices. It can also result in lack of consistency, which reduces the usability and interoperability of microservices. Lack of alignment and consistency reduce the evolution and innovation of microservices.

The right modularization is essential if you want to benefit from using microservices. For example:

- **Maintain modules easily**

The right modularization helps you create simple, consistent, and reusable services that are easy to read, understand, debug, and modify. It also enables the isolation and decoupling of services, which reduces the risk of errors or conflicts when changing or adding new features.

- **Test each service individually and independently from the rest of the system**

The right modularization enables you to use automated testing and continuous integration, which improve the quality and reliability of the software product.

- **Deploy, update, or replace each service separately, without affecting the whole system**

The right modularization supports distributed and cloud-based architectures, which enhance the performance and availability of the software product.

- **Have clear and well-defined interface and responsibility of each service**

The right modularization reduces the coupling and dependency between services, which minimize the impact of failures or errors in one service on the rest of the system. It also enables fault tolerance and recovery mechanisms, which improve the resilience and robustness of the software product.

- **Modify or extend each service to meet changing requirements or customer needs**

The right modularization increases the flexibility and diversity of the software product, as different services can be combined or configured in various ways.

- **Evolve each service independently or collaboratively, without affecting the overall system functionality**

The right modularization promotes innovation and creativity, as new services can be created or reused to generate novel solutions or features.

Learn Why Domain-Driven Design Is an Adequate Approach

Domain-driven design is a major software design approach, focusing on modeling software to match a domain according to input from that domain's experts. Under domain-driven design, the structure and language of software code (class names, class methods, class variables) should match the business domain.

Domain-driven design helps achieving the traits of a good modularization by:

- **Placing the project's primary focus on the core domain and domain logic**

Domain-driven design emphasizes close collaboration between domain experts and developers to create software that accurately models the problem domain. By focusing on the domain's core concepts, relationships, and behavior, domain-driven design enables you to create more robust, flexible, and maintainable systems.

- **Building complex designs on the model of the domain**

Domain-driven design helps you to define the boundaries of each module by identifying the core concepts, aggregates, and their associated business logic. This enables teams to develop and maintain these modules independently, promoting scalability and modularization within the overall system.

- **Initiating a creative collaboration between technical and domain experts to iteratively refine a conceptual model that addresses particular domain problems**

Domain-driven design fosters a common language shared by domain experts, users, and developers: the ubiquitous language. The ubiquitous language is used in the domain model and for describing system requirements. This enhances the communication and understanding among the stakeholders, and facilitates the adaptation and evolution of the software product.

Learn About the Domain-Driven Design Starter Modeling Process

The domain-driven design starter modeling process is a process for learning and applying domain-driven design in practice. It covers eight steps from aligning with the business model to coding the domain model. It is flexible and iterative, and suitable for beginners who want to master domain-driven design. See the [Domain-Driven Design Starter Modeling Process](#) 📖 GitHub repository that is part of the [Domain-Driven Design Crew](#) 📖 GitHub organization.

Check How Complex Your Scenario Is

Check which requirements your scenario has and sum up the points for the respective requirement. If your score above is 7 or higher, you should evaluate how to leverage the concept and tools of the domain-driven design in your project.

We also recommend that you follow the domain-driven design modeling process.

See [Domain-Driven Design Starter Modeling Process](#) 📖 .

Scenario Requirements	Points	Comments
For applications that work with the four functions: create, read, update, delete (CRUD), and only perform simple database queries, no special design is required. A simple database tool with a user interface is enough.	0	A simple application does have the complexity to benefit elaborated design methods.
You have a simple application if it has up to 30 use cases. You can build it with a CAP application that works with the four functions: create, read, update, delete (CRUD).	1	Just for reference, this means your application does not have more than 30 functions.
Your application has between 30 and 40 use cases.	2	Make sure you don't underestimate any hidden complexities. However, having many methods or functions doesn't always mean high complexity. They might be simple and well-structured. It's when a class or module has many responsibilities, indicated by methods or functions that perform widely varying tasks, that complexity becomes a challenge.
Your application may not be complex now, but it could grow later.	3	Talk to domain experts to discuss the complexity of your application. The complexity increases with the number of features that the stakeholders need.
Your application will change a lot over time, and you don't know what kind of changes will happen.	4	You require a sophisticated design method to manage the complexity of refactoring your model over time.
You are building an application in a new and exciting domain that nobody has done before. This means it could be complex and challenging.	5	You need to collaborate with domain experts and try different models to make your application work.

Related Information

[Domain-Driven Design Crew GitHub Organization](#) ➡

[Domain-Driven Design Community at SAP](#) ➡

Building Blocks

In the SAP BTP Developer's Guide you can find more about the standards that you should follow when developing cloud applications, an overview of the basic SAP BTP concepts, a list of important services you can use, and what is the optimal and fast way to set up your development environment depending on the technologies you are using.

Business Application Services

As business applications are having common characteristics, you can benefit from an open architecture with as few as possible, but well documented, technology choices.

The architecture blueprint outlines ABAP Cloud and SAP Cloud Application Programming Model (CAP) as the best architecture styles to implement business applications. Both programming models integrate with SAP BTP services.

See [Business Application Services](#).

Basic Platform Setup

SAP Business Technology Platform (SAP BTP) is an integrated offering comprised of five technology portfolios: application development, automation, integration, data and analytics, and AI. The platform offers users the ability to turn data into business value, compose end-to-end business processes, and build and extend SAP applications quickly. Access all SAP BTP resources on the product page: [SAP Business Technology Platform \(SAP BTP\)](#).

Learn about basic concepts, such as setting up the correct organizational structure to creating an account and managing users and members. See [Basic Platform Setup](#).

Development Environment

SAP BTP supports Cloud Foundry, Kyma, and ABAP runtimes. It features a number of tools and programming languages that increase your flexibility and freedom when developing applications. You can choose the runtime that best suits your use cases and skill set and get to work. You also have the possibility to integrate applications you've built with other solutions by SAP.

See [Software Development and Delivery](#).

Business Application Services

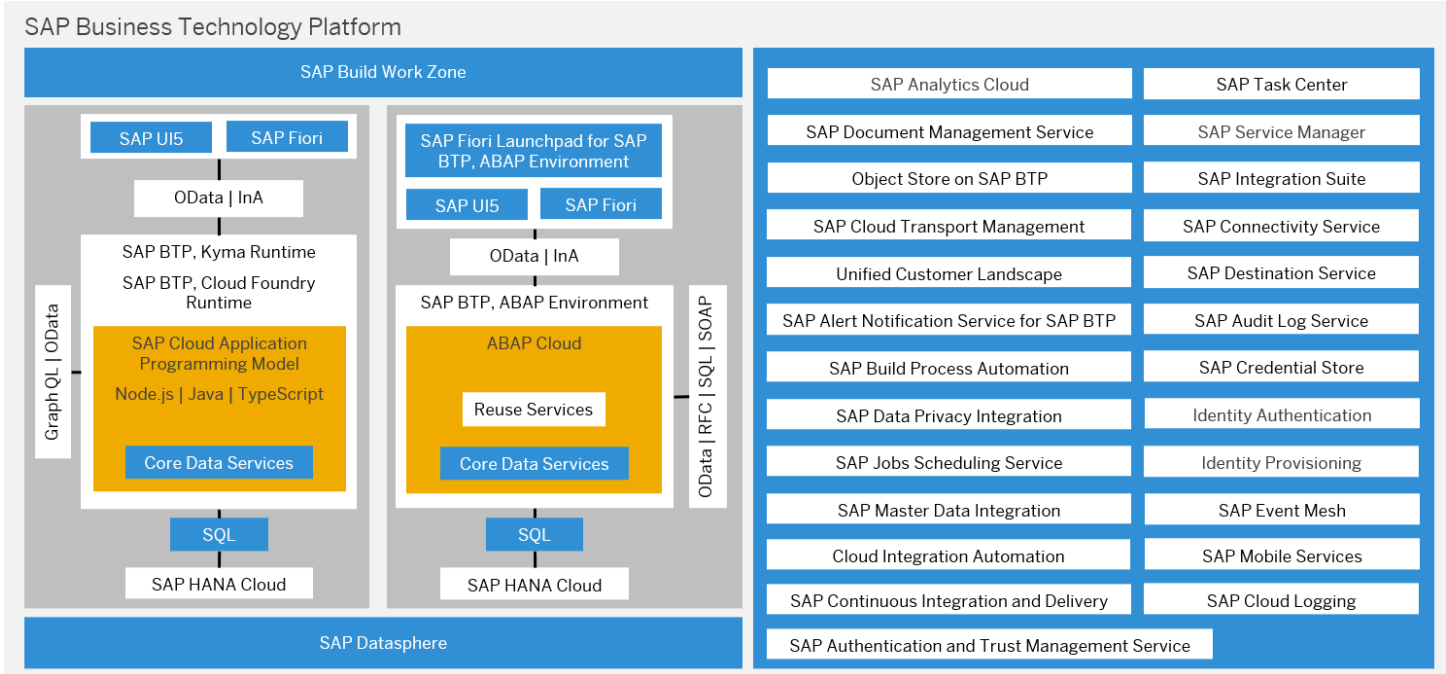
SAP BTP Developer's Guide has a comprehensive set of tools and services at your disposal that allow you to keep the pace and at the same time benefit from future investments in SAP BTP. The following graphic includes both ABAP and non-ABAP runtimes and provides an overview of the architecture you can use when designing and building your applications.

The overall suite of applications consists of multiple business modules that are either implemented for SAP Cloud Application Programming (CAP) or ABAP Cloud. Each business module consists of one or multiple self-contained services following a three-tier architecture with presentation, logic, and persistence layer. In both architecture styles, SAP Fiori and SAPUI5 is used to implement front end artifacts. These front end artifacts are consuming its data using OData for transactional and InA for analytical applications.

The application logic for CAP-based applications is implemented in Node.js, Java and Typescript and is deployed in SAP BTP, Cloud Foundry runtime or SAP BTP, Kyma runtime. The application logic for ABAP Cloud is implemented in ABAP and deployed in the SAP BTP, ABAP environment. In both cases, SAP HANA Cloud is used to store relational business data.

Additional enterprise qualities are reached by integrating the business modules with complementing SAP BTP application services such as SAP Build Work Zone as a central entry point, SAP Datasphere as a cross-application data warehouse or Identity Authentication for identity authentication among others.

This image is interactive. Hover over the image and click the highlighted areas so you are placed in the respective cell in the table.






Please note that image maps are not interactive in PDF output.


Capability	Cloud Application Programming	ABAP Cloud
Development Tools	<p>SAP Business Application Studio</p> <p>Designed and optimized for business application development in SAP ecosystems, SAP Business Application Studio enhances productivity by offering specialized tools for various scenarios, including SAP Fiori application development, SAP HANA native extensions, full-stack and mobile application development, and more.</p> <p>Central to the development environment is Code-OSS, the open-source foundation of Visual Studio Code, ensuring a familiar experience for developers when creating SAP-centric applications. SAP Business Application Studio streamlines the building, testing, and deployment of applications with integrated features for source control and testing. Furthermore, its Full-Stack Application Productivity Toolkit offers intuitive visual tools covering the entire development process, guaranteeing seamless integration with various SAP services and solutions.</p>	<p>ABAP Development Tools for Eclipse</p> <p>SAP Business Application Studio</p> <p>Use ABAP development tools for Eclipse to benefit from an efficient development environment for all ABAP-based development artifacts. Use the SAP Business Application Studio to develop the SAP Fiori parts of your ABAP-based applications.</p>

Capability	Cloud Application Programming	ABAP Cloud
Software Delivery	<p>SAP Continuous Integration and Delivery</p> <p>Use SAP Continuous Integration and Delivery for non-ABAP applications with a full end-to-end support for SAP BTP cloud applications.</p> <p>SAP Continuous Integration and Delivery lets you configure and run predefined continuous integration and delivery (CI/CD) pipelines that automatically build, test, and deploy your code changes to speed up your development and delivery cycles.</p> <p>Use SAP CI for non-ABAP applications with a full end-to-end support for SAP BTP cloud applications.</p> <p>SAP CI guides along solid tests, zero-downtime deployment, consistency, release via feature activation, operation guidance. It supports full end-to-end support for BTP cloud applications.</p> <p>Consider the complete innovation lifecycle that includes (beside others) Design Thinking, Domain Driven Design, Feature (Toggle) Definition, local build, unit tests, integration tests, end-to-end tests, progressive deployment, feature activation, documentation, DevOps monitoring, usage tracking, metering, adoption measurement and closing the feedback loop.</p>	<p>ABAP Lifecycle Management</p> <ul style="list-style-type: none">For customers:<p>Develop applications as software components and deliver them via the Manage Software Components application. See Software Components.</p><p>A hidden Git repository is automatically managed per software component using gCTS for transport management. This process can be automated with CI/CD pipelines including steps like test automation using ABAP Test Cockpit. See Automate the Software Lifecycle Management Process.</p><p>SAP Cloud Transport Management can be used to optionally integrate with higher level change management processes. See How to Export Using SAP Cloud Transport Management.</p>For partners:<p>In addition to the customer scenario, products can be built based on software components with the help of the Landscape Portal to setup multitenant SaaS applications or to offer installable products like SDKs for other customers and partners. See Landscape Portal.</p>

Capability	Cloud Application Programming	ABAP Cloud
	<p>SAP Cloud Transport Management</p> <p>Optionally complement your pipeline with an automated handover of your qualified changes into a standardized, enterprise-ready change management process. For changes in SAP BTP, Cloud Foundry runtime, the pipeline provided by SAP Continuous Integration and Delivery service allows to trigger out-of-the-box a transport in SAP Cloud Transport Management service.</p> <p>With other CI/CD solutions, you can also trigger such a transport via project 'Piper'. SAP Cloud Transport Management allows you to centrally define delivery landscapes and to then handle the transport of development and application-specific content between the subaccounts defined in this landscape. With this, you can add additional control for the propagation of your changes especially towards your production environments, such as by defining who is allowed to come up and handle changes in which environment. Also, you gain the option to apply existing or new change management processes, such as being offered by change and deployment management capabilities of SAP Cloud ALM – for example, to centrally synchronize the delivery of SAP BTP changes with changes from other environments, as part of hybrid applications. You can also use SAP Cloud Transport Management to transport your changes without pipeline.</p>	
Persistence	<p>SAP HANA Cloud</p> <p>Use SAP HANA Cloud service for a relational storage.</p> <p>Use HANA Data Lake Files as Object Storage.</p> <p>Consider compliance features like such as Audit Log, Cryptography or Customer Managed Keys that SAP HANA Cloud offers.</p> <p>Object Store on SAP BTP</p> <p>Object Store service on SAP BTP lets you store and manage objects, which involves creation, upload, download, and deletion. This service is specific to the Infrastructure-as-a-Service layer such as Azure Blob Storage, Amazon Web Services, and Google Cloud Platform.</p>	<p>SAP HANA Cloud</p> <p>SAP BTP, ABAP environment comes with an own ABAP-managed SAP HANA Cloud instance. Static resizing of the SAP HANA Cloud instance is supported. ABAP dictionary tables can be tagged to make use of the SAP HANA Native Storage Extensions; also, database indexes (like unique secondary indexes and fuzzy search indexes) and Dynamic View Caches can be defined. Furthermore, simple Database Partitioning based on primary keys is possible. Access to the SAP HANA instance data is only supported via the ABAP layer, for example, by using ABAP SQL, natively via ABAP-managed database procedures, and the ABAP SQL Service for external clients.</p>

Capability	Cloud Application Programming	ABAP Cloud
Programming Model	<p>SAP Cloud Application Programming Model (CAP) </p> <p>Use SAP Cloud Application Programming Model as programming model for non-ABAP applications.</p> <p>Go-to frameworks for business application development. It supports the most widely adopted languages, which are: Java (with Spring Boot), JavaScript and TypeScript (with Node.js).</p> <p>SAP Cloud Application Programming Model guarantees to run against specific versions of Node.js and Java. Remember to plan your application to run for at least 5 years if not more.</p> <p>We recommend that you choose SAP BTP services over homegrown services.</p>	<p>ABAP RESTful Application Programming Model (RAP)</p> <p>Use ABAP RESTful Application Programming Model as a programming model within ABAP Cloud. With ABAP RESTful Application Programming Model, you can develop services for all types of SAP Fiori applications as well as publishing Web APIs.</p>
Runtime	<p>SAP BTP, Cloud Foundry Runtime</p> <p>Use SAP BTP, Cloud Foundry runtime as a runtime for CAP-based applications.</p>	<p>SAP BTP, ABAP Environment</p> <p>Use SAP BTP, ABAP environment for ABAP-based applications.</p> <p>SAP BTP, ABAP environment delivers and enforces the ABAP Cloud development model and is based on Kubernetes. The abstraction of containers and clusters is managed by the SAP BTP, ABAP environment infrastructure.</p>
	<p>SAP BTP, Kyma Runtime</p> <p>Use SAP BTP, Kyma runtime as a runtime for CAP-based applications.</p>	
Client Library	<p>SAP Cloud SDK</p> <p>CAP is using SAP Cloud SDK behind the scenes.</p> <p>SAP Cloud SDK provides client libraries for consuming OData/OpenAPI services, Destination service, and Connectivity service that extend SAP solutions and other OData/OpenAPI services on SAP Business Technology Platform. These clients allow you to concentrate on your unique business logic, simplifying development and ensuring seamless integration.</p>	<p>Service Consumption Model</p> <p>Use the Service Consumption Model to generate local ABAP APIs to consume remote OData, SOAP and RFC services.</p>

Capability	Cloud Application Programming	ABAP Cloud
Connectivity	SAP Connectivity Service Use Connectivity service to securely access on-premise systems which are exposed via Cloud Connector. Using Cloud Connector service channels, it is also possible to access cloud systems such as databases from on-premise networks. For Kubernetes-based workloads, you can utilize the Connectivity Proxy to ensure secure technical connectivity from the cloud to your on-premise systems. Within the Kyma runtime, the Connectivity Proxy comes as a managed offering.	SAP Connectivity Service The Connectivity service is automatically integrated with the BTP ABAP tenants to securely access on-premise systems which are exposed via Cloud Connector.
	SAP Destination Service Use Destination service to store and retrieve technical connection properties to the target systems. It automates the process of retrieving OAuth access tokens to the configured target systems. In addition, the Destination service generates and is able to renew X.509 client certificates issued by the SAP Cloud PKI.	Communication Management SAP BTP, ABAP Environment provides a Communication Management to integrate the custom applications with other systems to enable data exchange. An event consumption and event provisioning is also natively supported and integrated into the ABAP RESTful Application Programming Model (RAP). In addition, the SAP Destination Service can also be used to re-use destinations for CAP applications. See SAP Destination Service .
Application Programming Interface	SAP Business Accelerator Hub  Follow API guidelines and use the SAP Business Accelerator Hub.	
User Interface (Web)	SAP Fiori Elements  SAPUI5 Use SAP Fiori elements for OData V4 to benefit from a presentation of a common UI and UX. For more flexibility, use SAP Fiori element's Flexible Programming Model with or without SAPUI5 Freestyle. Personalization and theming are automatically supported. SAP Fiori elements and SAPUI5 help you present one consistent solution experience to your customers, and you benefit from the upcoming designs and UX improvements automatically. Remember that even the simplest UI components or more complex ones like geographic maps have compliance requirements like accessibility and theming.	

Capability	Cloud Application Programming	ABAP Cloud
User Interface (Mobile)	SAP Mobile Development Kit  SAP BTP SDK for Android SAP BTP SDK for iOS <p>Use SAP MDK, BTP SDK for Android or BTP SDK for iOS for mobile applications.</p> <p>These SDKs help you present one consistent solution experience to your customers.</p> <p>Mobile application development is massively accelerated as SAP mobile services and its SDKs generate the complete synchronization and authentication layer. Additional supported features like logging, tracing, crash reporting bring extra value to you.</p> <p>After deployment the Mobile services give administrators all the necessary tools and services to operate a mobile solution. Features like push, offline, mobile specific security and more simplify the operation.</p>	
Central Entry Point	SAP Work Zone, standard edition SAP Build Work Zone, advanced edition SAP HTML5 Application Repository Service for SAP BTP <p>Enable the central launchpad to offer a unified end-user experience.</p> <p>Customers want to create a personalized view on the applications you produce. Make sure your application can be added to a central launchpad, regardless of where it runs.</p>	SAP Fiori Launchpad for SAP BTP, ABAP Environment SAP Work Zone, standard edition SAP Build Work Zone, advanced edition SAP HTML5 Application Repository Service for SAP BTP <p>SAP BTP, ABAP Environment comes with a dedicated central entry point the SAP Fiori launchpad for SAP BTP, ABAP Environment. This central entry point offers a unified end-user experience for ABAP-based applications. It is also used as the entry point for all SAP Fiori applications to administer the ABAP system.</p> <p>SAP Build Work Zone, standard edition offers a unified end-user experience across several systems for federation scenarios.</p>
Integration	SAP Event Mesh SAP Event Broker for SAP cloud applications SAP Integration Suite, advanced event mesh <p>SAP Event Mesh can be used to distribute events between selected SAP cloud and on-premise applications and third-party applications.</p> <p>SAP Event Broker for SAP cloud applications and SAP Integration Suite, advanced event mesh are currently not supported by CAP and ABAP Cloud.</p>	
	SAP Master Data Integration <p>SAP Master Data Integration service acts as the central master data hub. It uses the integration models of SAP One Domain Model as the basis for master data replication. SAP will extend the support of SAP One Domain Model in all SAP cloud applications over time to integrate them. When out-of-the-box integration with SAP Master Data Integration is not available, SAP Integration Suite can be used to integrate with SAP ERP Central Component, SAP S/4HANA, and non-SAP applications.</p>	

Capability	Cloud Application Programming	ABAP Cloud
	<p>SAP Integration Suite</p> <p>Use the Cloud Integration capability of SAP Integration Suite for mediated data or process integration, especially if complex integration flows, transformations or dedicated protocols are required. Besides mediated application-to-application integration, Cloud Integration usage is recommended for business-to-business and business-to-governance processes.</p> <p>The API Management capability of SAP Integration Suite allows you to easily enable your developer community with governed, secure, and policy-compliant access to all your APIs, events, and integrations.</p> <p>Graph is a recent addition to the API Management capability of SAP Integration Suite. Graph is a powerful semantic API mediation, combining and exposing the data from diverse systems in a complex enterprise landscape as connected data graphs. The data graphs are accessed via a single, curated, and uniform data-as-a-service API and make API consumption much easier.</p> <p>Cloud Integration Automation</p> <p>Cloud Integration Automation service provides you a guided workflow to integrate SAP cloud solutions to on-premise and other SAP cloud solutions. The guided workflow contains instructions for manual and automated tasks to enable an easy and quick integration configuration setup.</p>	
Observability	<p>SAP Cloud ALM</p> <p>SAP Cloud ALM helps you to implement and operate intelligent cloud and hybrid business solutions.</p> <p>For your CAP-based applications on SAP BTP, SAP Cloud ALM provides a central, personalized and unified operations user experience. Specifically for Java and Node.js custom-built applications in SAP BTP, Cloud Foundry runtime, there are the Data Collection Instrumentation Libraries based on Open Telemetry designed to enable the data collection infrastructure in SAP Cloud ALM. With these libraries, you can collect data for many observability use cases, such as:</p> <ul style="list-style-type: none"> • Real User Monitoring • Real User Monitoring • Health Monitoring • Integration and Exception Monitoring <p>SAP Alert Notification service for SAP BTP</p> <p>Local expert tool that allows you to subscribe to events from the platform – such as from used services, from your custom-built apps, or from the infrastructure – and to consume them via your channel of choice (such as by receiving notifications via email or in your preferred chat application). Can be integrated into central alerting of SAP Cloud ALM.</p>	<p>SAP Cloud ALM</p> <p>All ABAP cloud applications are supported by SAP Cloud ALM for central observability. SAP Cloud ALM provides the following use cases:</p> <ul style="list-style-type: none"> • Real User Monitoring • Health Monitoring • Synthetic User Monitoring • Integration Monitoring • Job and Automation Monitoring • Data Forwarding to SAP Focused RUN <p>For Health Monitoring, you could extend the delivered content with your own custom metrics.</p> <p>SAP BTP, ABAP Environment strictly distinguishes between platform monitoring and application monitoring. The platform monitoring, like availability monitoring, is ensured by the service itself.</p> <p>For application monitoring, which is in your responsibility, respective tools are offered. Use the Technical Monitoring Cockpit to analyze and optimize the application on-stack:</p> <ul style="list-style-type: none"> • System workload • Resource consumption and capacity

Capability	Cloud Application Programming	ABAP Cloud
	SAP Cloud Logging SAP Cloud Logging allows you to analyze your SAP BTP workloads in great detail regarding performance, errors, usage, and other characteristics. It covers processing of logs, metrics, traces across SAP BTP, Cloud Foundry runtime and SAP BTP, Kyma runtime with flexible storage, alerting, and dashboarding.	<ul style="list-style-type: none">• Detailed statistics captured for single requests• Outbound communication• SQL statements

Capability	Cloud Application Programming	ABAP Cloud
Customer Landscape Discovery	<p>Unified Customer Landscape</p> <p>Use Unified Customer Landscape service for customer landscape management.</p> <p>There are different ways to add systems to the System Landscape page in the SAP BTP cockpit: manually or automatically. If a system of your solution is associated with your global account or through a subscription in SAP BTP cockpit associated with a given subaccount, it will appear in the list automatically. Otherwise, you have to add your system manually. Systems are added to the list in one of the following ways:</p> <ul style="list-style-type: none">Auto-Discovered <p>An auto-discovered system is a system (associated with the given global account) that has been discovered and added automatically to the list based on information of the existing system landscape. Any SAP system of the supported system types that is associated with the same customer ID, with which your global account in SAP BTP is associated, will be added automatically in the system landscape list.</p> <ul style="list-style-type: none">Subaccount/<my-subaccount> <p>Specifies that the system has been added through a subscription in SAP BTP cockpit associated with a given subaccount. The subscription has been discovered and added automatically through the subaccount.</p> <ul style="list-style-type: none">Manually-Added <p>Specifies that the system has been added to the list manually by the global account administrator, using the Add System button and completing the wizard. The system has been associated with the global account in SAP BTP.</p>	<p>Landscape Portal</p> <p>Landscape Portal is offered to manage all the systems within your global account in SAP BTP. It shows the list of the ABAP systems, it enables the control of system hibernation to reduce costs and it offers features to control the system lifecycle, for example, to nominate systems for the pre-upgrade prior to the standard upgrade of a quarterly ABAP platform release.</p>

Capability	Cloud Application Programming	ABAP Cloud
Extensibility and Integration	<p>Side-by-Side Extensibility with Unified Customer Landscape:</p> <ul style="list-style-type: none"> • Register Systems • Create Formations • SAP SuccessFactors Extensibility Service • SAP S/4HANA Cloud Extensibility Service <p>Use Unified Customer Landscape service that offers customer landscape management capabilities for your SAP S/4HANA, SAP Ariba, SAP SuccessFactors, and other SAP and third-party systems in one single experience.</p> <p>In the SAP BTP cockpit, you get a comprehensive overview of all your systems associated with your customer ID. These systems can be registered or auto discovered. They are conveniently listed as a record in the Systems list in the System Landscape page in the SAP BTP cockpit. Moreover, Unified Customer Landscape lets you integrate one or more systems in a common business case by including these systems in a formation.</p>	<p>On-Stack Extensibility by Extending SaaS Applications</p> <p>In addition to the standard side-by-side approach for core applications such as SAP S/4HANA, SAP BTP, ABAP Environment also offers two extensibility options within the product itself:</p> <ul style="list-style-type: none"> • With developer extensibility, you can extend partner solutions which are installed in your customer system, for example by adding custom fields, custom nodes and business logic. • With key user extensibility, you can extend a multitenancy SaaS application offered by a partner. The supported extensibility features to extend SaaS applications are UI adaptations, custom fields and custom logic (implement Business Add-Ins). <p>You can create business configuration objects. See Business Configuration.</p> <p>You can create and set up integration scenarios by maintaining communication arrangements.</p>
Data Privacy	<p>SAP Data Privacy Integration</p> <p>SAP Personal Data Manager</p> <p>SAP Data Retention Manager</p> <p>Use Data Privacy Integration service to make your SAP BTP application compliant with the corporate Data Privacy and Protection standards. Integrate with the Data Privacy Integration service to support cross consumable Data Privacy and Protection features for our customers and support cross Data Privacy and Protection compliance in end-to-end processes.</p>	

Capability	Cloud Application Programming	ABAP Cloud
Workflow	<p>SAP Task Center</p> <p>SAP Task Center service enables integration with SAP applications to provide a single entry point for end users to access all their assigned tasks. The tasks can be accessed by end users through the SAP Task Center Web application. SAP Task Center helps you integrate tasks into a central solution.</p> <p>Use SAP Task Center as a unified inbox for tasks across multiple applications with integrated user experience. Tasks from multiple SAP solutions are gathered in one list and ready to be processed in just one click, shortening the completion time for business-critical tasks. For example, business users can process all their tasks from the connected systems, without the need to switch and log in separately into different inboxes.</p> <p>SAP Build Process Automation</p> <p>SAP Build Process Automation provides a simpler and faster way to adapt, improve, and innovate business processes with drag-and-drop simplicity.</p> <p>The solution combines workflow management, SAP Intelligent Robotic Process Automation (SAP Intelligent RPA) functionality, decision management, process visibility, and embedded AI capabilities into one intuitive low-code experience.</p> <p>You can jumpstart automation projects with hundreds of process content packages, SAP Intelligent RPA bots and connectors designed specifically to enhance the capabilities of the SAP solutions you are using. It provides a unified development experience for users of all skill levels enabling fusion teams of business experts and developers to work together and solve challenges faster.</p>	
Job Scheduling	<p>SAP Job Scheduling Service</p> <p>SAP Job Scheduling service allows you to define and manage jobs that run once or on a recurring schedule. Use this runtime-agnostic service to schedule action endpoints in your application or long-running processes using Cloud Foundry tasks. Use REST APIs to schedule jobs, including long-running jobs asynchronously, and create multiple schedule formats for simple and complex recurring schedules. Manage jobs and tasks and manage schedules with a web-based user interface.</p>	<p>Application Jobs</p> <p>Job scheduling is integrated into the product. Application Jobs can be defined, implemented and monitored.</p>
Application Logs		<p>Application Logs</p> <p>SAP Task Center helps you integrate tasks into a central Application Logging is integrated into the product. Application Logs can be defined, implemented, and monitored.</p>
Analytics	<p>SAP Analytics Cloud</p> <p>Use embedded analytics scenarios in your application including dashboards, multi-dimensional reports and KPIs.</p>	<p>SAP Analytics Cloud</p> <p>Use SAP Analytics Cloud on top of InA-enabled Core Data Service analytical models. Furthermore, Dragonfly-based multi-dimensional reporting can be used to integrate Embedded Analytics functionality in a component-based and SAP Fiori-native way.</p>

Capability	Cloud Application Programming	ABAP Cloud
	SAP Datasphere For analytics across applications use SAP Datasphere.	SAP Datasphere Via the ABAP SQL Service it is possible to integrate with SAP Datasphere. Furthermore, the ABAP SQL Service in combination with ABAP ODBC Driver or the SAP HANA Cloud ABAP SDA Adapter allows data federation via external clients respectively via SAP HANA Cloud-based SAP BTP applications.
Document Management	SAP Document Management Service Document Management Service, Integration Option lets you build document management capabilities for your business applications using the integration component or the easy-to-use, reusable UI component. Document Management Service, Application Option is a standalone, ready-to-use web application that provides document management capabilities for your enterprise content.	
Low Code/No Code	SAP Build SAP Build is a low-code offering to accelerate development and automation. It enables you to create enterprise apps (SAP Build Apps), automate processes (SAP Build Process Automation), and design business sites (SAP Build Work Zone) without writing code. Accelerate development with prebuilt connectors and business content for SAP and third-party systems to integrate seamlessly. SAP Build fosters collaboration between business and development teams with built-in governance and lifecycle management.	
Service Management	SAP Service Manager SAP Service Manager service allows you to consume platform services in any connected runtime environment, track the creation and management of service instances, and share services and service instances between different environments.	
Authentication	SAP Authentication and Trust Management Service The SAP Authorization and Trust Management service lets you manage user authorizations and trust to identity providers. Identity providers are the user base for applications. We recommend that you use an Identity Authentication tenant, an SAP on-premise system, or a custom corporate identity provider. User authorizations are managed using technical roles at the application level, which can be aggregated into business-level role collections for large-scale cloud scenarios.	Access Management User authorizations are managed and can be aggregated into business roles locally in SAP BTP, ABAP environment.

Capability	Cloud Application Programming	ABAP Cloud
	Identity Authentication The Identity Authentication service provides you with controlled cloud-based access to business processes, applications, and data. It simplifies your user experience through authentication mechanisms, single sign-on, on-premise integration, and convenient self-service options.	Identity Authentication The Identity Authentication service provides you with controlled cloud-based access to business processes, applications, and data. It simplifies your user experience through authentication mechanisms, single sign-on, on-premise integration, and convenient self-service options. Technical users for system-to-system communication are managed locally in the SAP BTP, ABAP environment. SAP BTP, ABAP environment supports mTLS and basic authentication as authentication options for technical users.
Audit Logging	SAP Audit Log Service SAP Audit Log is a core, security, and compliance-based SAP BTP service to provide means for audit purposes. The default and advanced capabilities of Audit Log Service are available for SAP BTP applications and services.	Manage Security Audit Log Security audit logging is provided automatically by the SAP BTP, ABAP Environment. It can be configured by the Manage Security Audit Log administration application.
		Read Access Logging Read Access Logging (RAL) is used to monitor and log read access to sensitive data. This data may be categorized as sensitive by law, by external company policy, or by internal company policy.
Security	SAP Credential Store SAP Credential Store service provides a repository for passwords, keys and keyrings for applications that are running on SAP BTP. It enables the applications to retrieve credentials and use them for authentication to external services, or to perform cryptographic operations and TLS communication. SAP Credential Store is exposed to the applications via a REST API.	Communication Management The ABAP environment offers its Communication Management. It contains a credentials store which allows the applications to perform outbound communication using the credentials for authentication to external services and TLS communication.
Identity Management	Identity Provisioning The Identity Provisioning service automates identity lifecycle processes. It helps you provision identities and their authorizations to various cloud and on-premise business applications.	Identity Provisioning The Identity Provisioning service automates identity lifecycle processes. SAP BTP, ABAP environment supports the Identity provisioning service to provision business users and their assignment to business roles.

Basic Platform Setup

Before you begin developing your applications, make sure your organizational and landscape setup is appropriate for managing their lifecycles.

Create a Governance Model

One of the first and most important steps of your journey to the cloud is to establish an appropriate organizational setup and corresponding governance model. A clear and well-thought-out organizational setup makes it easier for your employees to adopt agile processes. See [Creating a Governance Model](#) in the Best Practices for SAP BTP guide.

Set Up Your Account Model

The hierarchical structure between global accounts, directories, and subaccounts lets you define an account model that accurately fits your business and development needs. See [Setting Up Your Account Model](#) in the Best Practices for SAP BTP guide.

Manage Users and Members

User accounts enable users to log on to SAP BTP and access subaccounts and use services according to the permissions given to them. In this context, it's important to understand the difference between the two types of users that we refer to: platform users and business users.

Platform users are usually developers, administrators or operators who deploy, administer, and troubleshoot applications and services on SAP BTP.

Business users use the applications that are deployed in SAP BTP. For example, the end users of SaaS applications or services.

See [User and Member Management](#) in the SAP Business Technology Platform documentation.

Software Development and Delivery

Development Tools

SAP BTP includes many tools to help you develop and manage applications, and connect them to your on-premise systems. The availability of tools can depend on the environment and cloud management tools feature set that you are running on.

See [Development Tools](#).

Automated SAP BTP Infrastructure Setup

With the Terraform provider for SAP BTP, you can now use this standard to create Terraform scripts that set up your SAP BTP landscapes. The Terraform provider for SAP BTP enables you to automate the provisioning, management, and configuration of resources on SAP BTP.

See [Automated SAP BTP Infrastructure Setup](#).

Operate

SAP Cloud ALM helps you to implement and operate intelligent cloud and hybrid business solutions. You benefit from an out-of-the-box, native cloud solution running on SAP BTP, designed as the central entry point to manage your complete SAP landscape with content-driven guided implementation and highly automated operations.

See [Operate with SAP Cloud ALM](#).

Development Tools

SAP BTP includes many tools to help you develop and manage applications, and connect them to your systems. The availability of tools can depend on the runtime that you are running on.

Tool	Used For	Description
SAP BTP Cockpit	Account administration in SAP BTP	The SAP BTP cockpit is the web-based administration interface of SAP BTP and provides access to a number of functions for configuring and managing applications, services, and subaccounts. Use the cockpit to manage resources, services, security, monitor application metrics, and perform actions on cloud applications.
ABAP Development Tools for Eclipse	Programming in ABAP	The ABAP Development Tools for Eclipse enables you to perform ABAP-based development tasks, when you want to build, to extend, and to run ABAP Cloud applications. It supports features like syntax check, code completion, syntax highlighting, pretty printing, navigation, search, quick fixes.
SAP Business Application Studio	SAP Fiori development for ABAP and non-ABAP CAP full-stack application development	Designed and optimized for business application development in SAP ecosystems, SAP Business Application Studio enhances productivity by offering specialized tools for various scenarios, including SAP Fiori application development, SAP HANA native extensions, full-stack and mobile application development, and more. Central to the development environment is Code-OSS, the open-source foundation of Visual Studio Code, ensuring a familiar experience for developers when creating SAP-centric applications. SAP Business Application Studio streamlines the building, testing, and deployment of applications with integrated features for source control and testing. Furthermore, its Full-Stack Application Productivity Toolkit offers intuitive visual tools covering the entire development process, guaranteeing seamless integration with various SAP services and solutions.
SAP Build	Low-code, no-code	SAP Build enables everyone, no matter the skill level, to create and augment enterprise applications, process automations, and business sites with drag-and-drop simplicity.
Command Line Interface for Cloud Foundry	Managing subaccounts in the SAP BTP, Cloud Foundry runtime	The Cloud Foundry command line interface enables you to work with the Cloud Foundry runtime to deploy and manage your applications.

Tool	Used For	Description
kubect1 ➡	Kubernetes tool connected with SAP BTP, Kyma runtime	The Kubernetes command line tool to communicate with a Kubernetes cluster's control plane, using the Kubernetes API.
kubelogin ➡	Kubernetes tool connected with SAP BTP, Kyma runtime	A kubect1 plugin for Kubernetes OpenID Connect (OIDC) authentication.
Helm ➡	Kubernetes tool connected with SAP BTP, Kyma runtime	The package manager for Kubernetes, used for installing and managing Kubernetes applications in form of Helm charts.
Paketo (Pack) ➡	Kubernetes tool connected with SAP BTP, Kyma runtime	Pack is a tool maintained by the Cloud Native Buildpacks project to support the use of buildpacks. Pack lets you build container images, which are collaboratively maintained making it easier to maintain and update.
Docker Desktop ➡	Kubernetes tool connected with SAP BTP, Kyma runtime	Docker Desktop is an application that enables you to manage (build, push, pull, and run) container images on your desktop and a docker-compatible command line interface.
SAP Cloud SDK	Programming in Java and JavaScript	SAP Cloud SDK provides a layer of abstractions for features of SAP BTP such as logging, multitenancy, and connectivity. It also includes project templates for different execution environments and implementations.
Service-Specific Tools		The services that run on SAP BTP can come with service-specific tools. For an overview of the services and their tools, see the SAP Discovery Center ➡.

Automated SAP BTP Infrastructure Setup

Terraform is the de-facto industry standard for infrastructure as code with more than 3000 providers. With the Terraform provider for SAP BTP, you can now use this standard to create Terraform scripts that set up your SAP BTP landscapes. Given the nature of Terraform, it is even possible to add non-SAP infrastructure to those scripts if the infrastructure provider offers a Terraform provider as well.

The Terraform provider for SAP BTP enables you to automate the provisioning, management, and configuration of resources on SAP BTP. By leveraging this provider, you can simplify and streamline the deployment and maintenance of SAP BTP services and applications. See [Terraform Provider for SAP BTP](#) ➡.

Currently, the Terraform provider for SAP BTP is available for non-productive use and SAP is working with several customers on shaping the first release for productive use. You can check out some of the Terraform scripts in a samples repository in the [GitHub repository for the Terraform Provider for SAP BTP](#) ➡.

Operate with SAP Cloud ALM

SAP Cloud ALM, where ALM stands for application lifecycle management, is included in your SAP Cloud Service subscription containing Enterprise Support, cloud editions, in SAP Enterprise Support and in Product Support for Large Enterprises.

This is custom documentation. For more information, please visit the [SAP Help Portal](#) ➡.

SAP Cloud ALM helps you to implement and operate intelligent cloud and hybrid business solutions. You benefit from an out-of-the-box, native cloud solution running on SAP BTP, designed as the central entry point to manage your complete SAP landscape with content-driven guided implementation and highly automated operations.

With the operations solutions in SAP Cloud ALM, you can handle both SAP BTP-based SaaS applications and your own applications.

SAP Cloud ALM for operations provides a personalized and unified operations user experience. You can use purpose-driven different monitoring, analysis, and management use cases optimized for certain operations aspects. SAP Cloud ALM for operations empowers you to understand the health of your SAP business solutions and acts as collaboration platform between lines of business and IT.

Under [Supported Solutions](#), you see which monitoring capabilities are available with SAP Cloud ALM. Under **SAP Solution**, filter for SAP BTP and check the supported services from the operations area.

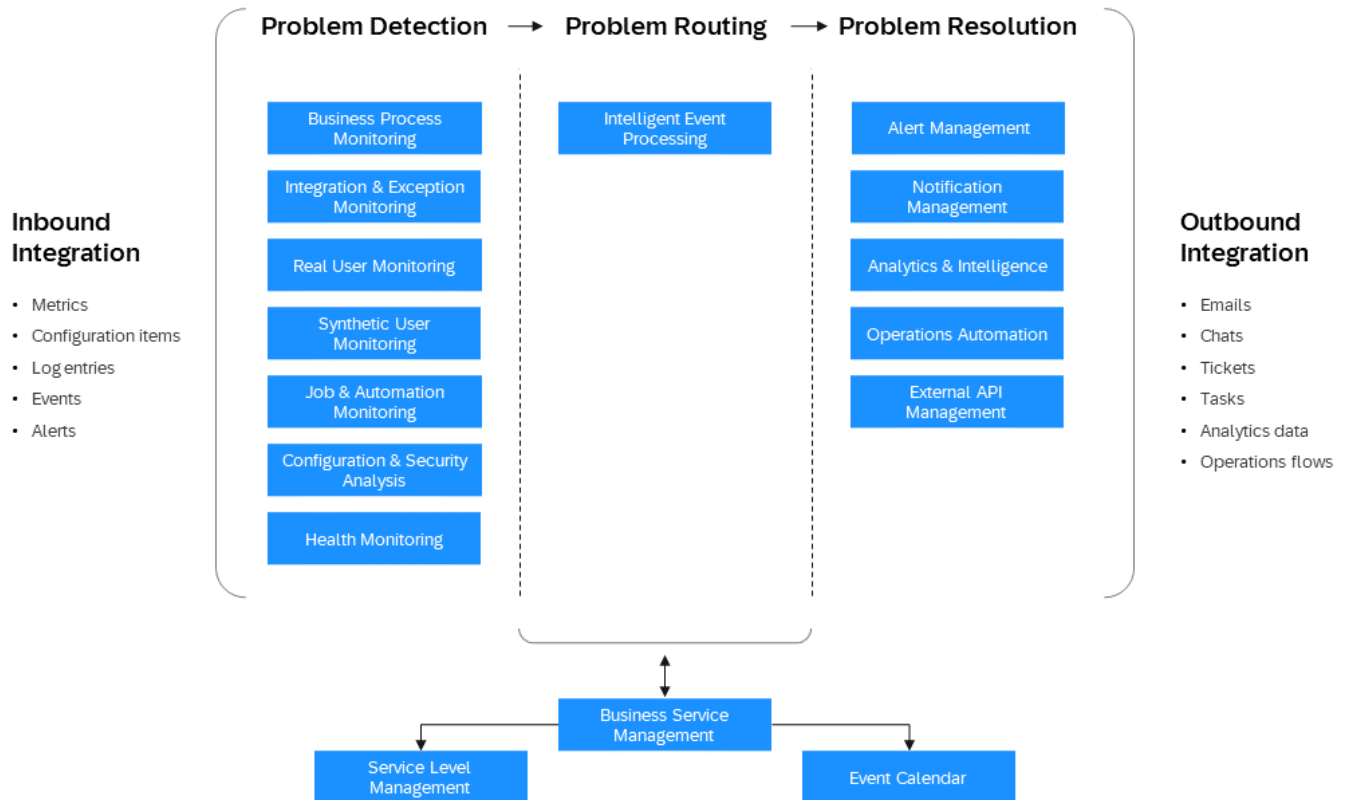
Benefit from the powerful **Intelligent Event Processing**, embedded analytics, and intelligence functionality with a large variety of inbound and outbound integration. **Synthetic User Monitoring** monitors the performance and availability of web applications from a client-side perspective based on Selenium-based scripts. **Business Service Management** consolidates all operational events at business service level and shows them in a well-arranged event calendar.

Specifically for Java and Node.js custom-built applications in SAP BTP, Cloud Foundry runtime, there are the Data Collection Instrumentation Libraries based on Open Telemetry designed to enable the data collection infrastructure in SAP Cloud ALM. With these libraries, you can collect data for the following use cases:

- **Real User Monitoring:** Leverage both front-end and back-end measurements on single request level.
- **Health Monitoring:** Gain insights on application health based on technical metrics.
- **Integration and Exception Monitoring:** Collect and react on exceptions raised by the application.
- **Job and Automation Monitoring:** Monitor SAP Job Scheduling Service jobs.

SAP Cloud ALM is the central place to integrate and access the monitoring of your existing IT service management processes, such as ticketing systems.

Inbound and outbound APIs enable you to integrate data from your own applications. For more information, see the [API Guide for SAP Cloud ALM](#).



More

- [Implement SAP Cloud ALM](#) via SAP for Me
- Application help for [SAP Cloud ALM for Operations](#)
- [SAP Cloud ALM for operations](#) (SAP Support Portal)
- [Expert Portal for SAP Cloud ALM Operations](#) (SAP Support Portal), with detailed configuration instructions