



IBM Cloud for SAP Applications: Implementation Guide and Reference Architecture

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IBM Cloud for SAP Applications

1.	<i>Introduction</i>	<i>3</i>
1.1	<i>Why IBM Cloud for SAP Applications?</i>	<i>3</i>
1.2	<i>IBM Cloud for SAP Applications</i>	<i>4</i>
1.3	<i>Advanced project services</i>	<i>4</i>
1.3.1	<i>Enterprise Architecture and SAP Basis</i>	<i>7</i>
1.3.2	<i>SAP Security</i>	<i>8</i>
2.	<i>IBM Cloud Computing Reference Architecture</i>	<i>9</i>
3.	<i>IBM Cloud for SAP Applications Reference Architecture</i>	<i>10</i>
3.1	<i>Hybrid Cloud</i>	<i>10</i>
3.2	<i>Hybrid Cloud Layers and Enabling Technologies</i>	<i>10</i>
3.2.1	<i>Hybrid Cloud Security</i>	<i>12</i>
3.2.2	<i>Localization</i>	<i>12</i>
3.2.3	<i>Hybrid Cloud Integration</i>	<i>12</i>
3.2.4	<i>Operational Visibility and Management</i>	<i>12</i>
3.2.5	<i>Workload Management</i>	<i>12</i>
3.2.6	<i>Development and Operations (DevOps) in a Hybrid Cloud Environment</i>	<i>13</i>
3.3	<i>End User to Cloud Data Center</i>	<i>13</i>
4.	<i>Account Set-up and Onboarding</i>	<i>14</i>
4.1	<i>Base Infrastructure</i>	<i>14</i>
4.2	<i>Operational Infrastructure</i>	<i>15</i>
4.3	<i>IBM's SAP Cloud Now</i>	<i>15</i>
5.	<i>Supported Software</i>	<i>15</i>
5.1	<i>Supported OS and Database Software</i>	<i>15</i>
5.2	<i>Supported SAP Application Software</i>	<i>15</i>
6.	<i>Managed Service Processes</i>	<i>16</i>
6.1	<i>Backup and Restore</i>	<i>16</i>
6.2	<i>Disaster Recovery</i>	<i>16</i>
6.3	<i>High Availability</i>	<i>17</i>
6.4	<i>Path-to-Production Management</i>	<i>17</i>
6.5	<i>Capacity Planning</i>	<i>17</i>
6.6	<i>Additional Support Services</i>	<i>17</i>
7.	<i>Security Description</i>	<i>17</i>
7.1	<i>Security Policies</i>	<i>17</i>
7.2	<i>Compliance</i>	<i>17</i>
8.	<i>Service Level Agreements in IBM Cloud for SAP Applications</i>	<i>18</i>
9.	<i>Service Level Objectives for the advanced project services uplift</i>	<i>18</i>
9.1	<i>Example Support Schedule</i>	<i>18</i>
9.2	<i>Example Non-Production Transformation Team Activities</i>	<i>19</i>
9.3	<i>Service Level Objectives</i>	<i>19</i>
9.4	<i>Work Prioritization Process for advanced project services</i>	<i>20</i>
10.	<i>Maintenance</i>	<i>21</i>
11.	<i>Service Desk</i>	<i>21</i>

1. Introduction

The purpose of this document is to provide information to our clients around performing an SAP¹ transformation in the IBM Cloud for SAP Applications with advanced project services. IBM Cloud for SAP Applications is IBM's managed cloud offering focused on managed services for SAP. Advanced project services is the uplift to support SAP transformation programs focused on SAP architecture, SAP Basis, and SAP Security services. The information provided in this document is not legally binding unless and until it is included in definitive agreements.

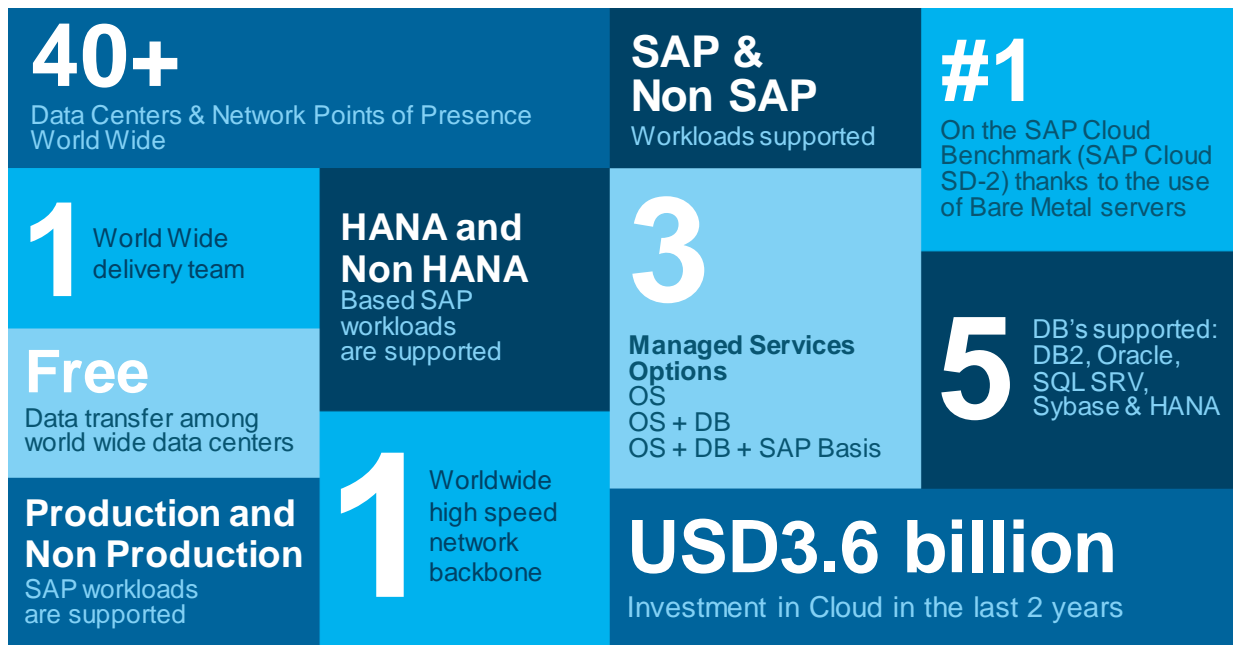
The offering from IBM enables our clients to consume cloud services, as required, to meet their business needs. This implementation guide provides an overview of how we collaborate to plan, design, and implement your SAP solution in IBM Cloud for SAP Applications with the advanced project services uplift.

The document focuses on the following details:

- Reference architecture
- Information required for onboarding to our cloud
- Advanced project services for SAP Transformation
- Overview of our managed IT processes
- Service Level Agreements for Production Operations
- Service Level Objectives for advanced project services

1.1 Why IBM Cloud for SAP Applications?

The following diagram shows a subset of our investments and differentiation in cloud for SAP.



¹SAP is a registered trademark of SAP SE or its subsidiaries in the U.S. and in other countries.

1.2 IBM Cloud for SAP Applications

IBM has deployed hardened enterprise class cloud infrastructure to IBM data centers distributed around the globe as a platform for managed SAP application platform services for our clients. This platform, called IBM Cloud for SAP Applications, is the foundation for the IBM Cloud Services portfolio of cloud offerings which provide managed application services for SAP.

In this base offering, all managed resources at the infrastructure point of delivery are shared among multiple clients. Our client's SAP services are provided from dedicated SAP systems on dedicated virtual servers and virtual LANs running in a shared infrastructure environment or on bare metal systems in a cloud, consumption model. Dedicated SAP systems running in a shared infrastructure cloud environment are commonly referred to as private shared cloud SAP implementations.

SAP Applications services are provided by IBM delivery teams who are experienced and skilled in delivering SAP deployment and management services in IBM global delivery center facilities and central management facilities. Cloud delivery data centers are being deployed in several geographies to allow IBM to host SAP instances in geographies close to where our clients conduct business operations.

The base offering focuses on sustaining production operations for our client's SAP environment. Service level agreements (SLAs) are provided for operations and are listed in section 8. The diagram below shows our current global data center footprint.



IBM Cloud Services has its own network that connects its data centers.
¹New data centers

1.3 Advanced project services

The advanced project services uplift on IBM Cloud for SAP Applications is a managed service solution providing SAP basis and SAP security services for your SAP transformation. These services are targeted at providing the architectural thought leadership, quick response, and flexibility required by SAP transformation programs. Advanced project services provides service level objectives (SLOs) for critical SAP basis and SAP security services required for SAP transformation system landscapes with production and non-production SAP systems.

In this uplift, IBM provides a client-dedicated, on-site delivery team to work with the SAP transformation team. We also provide client-dedicated, off-shore and near-shore resources as part of the SAP transformation delivery team to perform the managed services in a “follow-the-sun” model.

Advanced project services are provided by IBM delivery teams who are experienced and skilled in delivering SAP transformation services. The diagram below shows the coverage and skills provided by IBM Cloud for SAP Applications with the advanced project services uplift.

Definitions for the diagram are listed below:

App Security Strategy – Approach and Strategy for Applications Security. Includes complete solution of SAP, Bolt-ons, and Non-SAP.

App Security Design – Design for Applications Security. Includes complete solution of SAP, Bolt-ons, and Non-SAP.

Non-Functional Requirements –Non-functional requirements cover requirements which are not covered by the functional requirements. Examples include – performance, scalability, and availability.

Technical Design – Design for the transformation solution to include hybrid cloud (i.e., IBM Cloud, IBM On-Premise, IBM SaaS offerings, 3rd Party SaaS offerings, etc.)

Capacity Planning – Includes infrastructure sizing for the transformation effort and steady-state capacity planning process for ongoing operations.

Hybrid Cloud On-Boarding – Includes inputs to Onboarding documentation, Build Sheets, etc.

SSO Integration – Single Sign On for transformation solution.

GRC – Governance, Risk and Compliance.

User Roles & Authorizations - Implementation for Applications Security. Includes complete solution of SAP, Bolt-ons, and Non-SAP.

Vulnerability Scans – Scans for vulnerabilities.

User Administration – Creation and maintenance of user master records for all applications.

Installation – Installation of OS, DB, and Application.

Patching – Patching of OS, DB, and Application.

Installation Post-Processing – End-to-End post processing. Includes basis, security, transports, manual configuration, etc. We deliver a usable environment. Development, QA, and Production are examples of “environments”. Requirement is to provide automated orchestration for post-processing.

Monitoring – OS, DB and Application monitoring of SAP and non-SAP components.

Environment Refresh – Similar to Installation Post-processing. End-to-end post-processing to deliver a usable environment is required.

Landscape Plan & Admin – Alignment of landscape plan to client's release plan.

Path-to-Prod Management – Management of all landscapes (N, N+1, etc.) for transport packaging, etc.

Performance Tuning – Comprehensive and integrated tuning at all infrastructure layers. E.g., assessing dumps, indexes, expensive SQL, etc.

HA – High Availability

DR – Disaster Recovery

Bolt-ons & non SAP Admin – DBA and Applications administration for all applications in the client solution

Program Team Support – On demand basis and dba support for transformation activities.

Prod Technical Cutover – Includes planning, execution and on-demand support of technical cutover.

Backup – OS and DB backup and restore.

DB Administration – includes all database administration activities whether logical or physical. E.g., review of expensive SQL, indexing recommendations, etc.

Dictionary Changes – e.g., Creation of Z tables for SAP

Infrastructure – All infrastructure components. Network, servers, storage, etc.

Security & OS Patching – Vulnerability and other security patches. Patching of OS, DB, and Application.
Asset Management – Management of cloud infrastructure assets.

Configuration Management – Standard configuration management of the infrastructure.

Change Management – Standard change management of the infrastructure

Security Zones – Engaging the client on their security requirements and providing custom solutions as required within the cloud framework.

DNS – Engaging the client on their DNS policies and implementing DNS in the cloud.

Enterprise Directory – e.g., Active Directory

1.3.1 Enterprise Architecture and SAP Basis

Enterprise Architecture for SAP transformations is not just about SAP Basis Architecture

When IBM defines enterprise architecture for our clients, we take a broad view of the enterprise. SAP transformation and integration with legacy systems and external systems are considerations in the design. Design must be addressed end-to-end across all aspects of the solution. Our architect will review your existing policies and the business design to determine your non-functional and technical requirements. We will engage your internal teams and the system integration teams to approve a set of requirements that help us provide a comprehensive solution for your SAP transformation.

At a conceptual level, most of these requirements will come from these sources:

- Your IT policies
- Your non-functional requirements
- Environment sizing and business scope
- Business process design documents and technical design documents

We use standard architectural patterns to cover the majority of these requirements. The standard patterns are established to meet the majority of our client's requirements. However, we have the capability to provide custom solutions as required. Our design activities include addressing technical and non-functional requirements for:

- Technical Design
- Capacity Planning
- SSO Integration
- Monitoring
- Landscape Plan & Admin
- HA
- DR
- Bolt-ons & non SAP Admin
- Backup
- Infrastructure
- Security Zones
- DNS
- Enterprise Directory

Basis Administration and Services

Our focus for SAP basis administration and services is to provide the quick response and flexibility required by SAP transformation programs. Advanced project services provides service level objectives (SLOs) for critical SAP basis activities to ensure the best possible service for our transformation teams.

We provide client-dedicated, on-site, off-shore and near-shore basis personnel to perform the basis services in a “follow-the-sun” model.

1.3.2 SAP Security

Security is not just about authorizations

When IBM defines authorization and security requirements for our clients, we take a broad view of security in systems and process design. Security and business controls go hand-in-hand, and security should be addressed end-to-end across all vectors where threats exist. Security requirements should balance the tradeoff of probability x cost-to-mitigate x impact, instead of a technical approach of “secure it at all costs”. Our architect will review your existing policies to gather the bulk of the requirements, and engage your internal audit and IT security groups to approve a set of requirements that are standard functionality across the solution.

At a conceptual level, most of these requirements will come from these sources:

- Your system of internal controls, overseen by your audit team
- Your IT security policies and standards
- A penetration test, performed by your IT security team.

These sources should cover a broad set of requirements. If they do not, we use a framework for broad security coverage, that includes the following activities:

- Physical and logical security over the hardware and networks
- Identification, classification, and protection of sensitive data
- Development of secure code
- Security training
- Routine security monitoring, with manual and automated controls
- Vulnerability management to protect against continuously-emerging threats
- Separation of duties and user access controls
- Security and controls compliance, and more.

By defining a broad context for security design, your budget for securing the new solution will be spent more effectively. Otherwise, you may overspend on strict user security while leaving back doors open in a penetrable solution.

Authorization requirements

We use four principles to guide requirements and design of authorizations on our projects, aimed at providing a secure solution with lower ongoing costs:

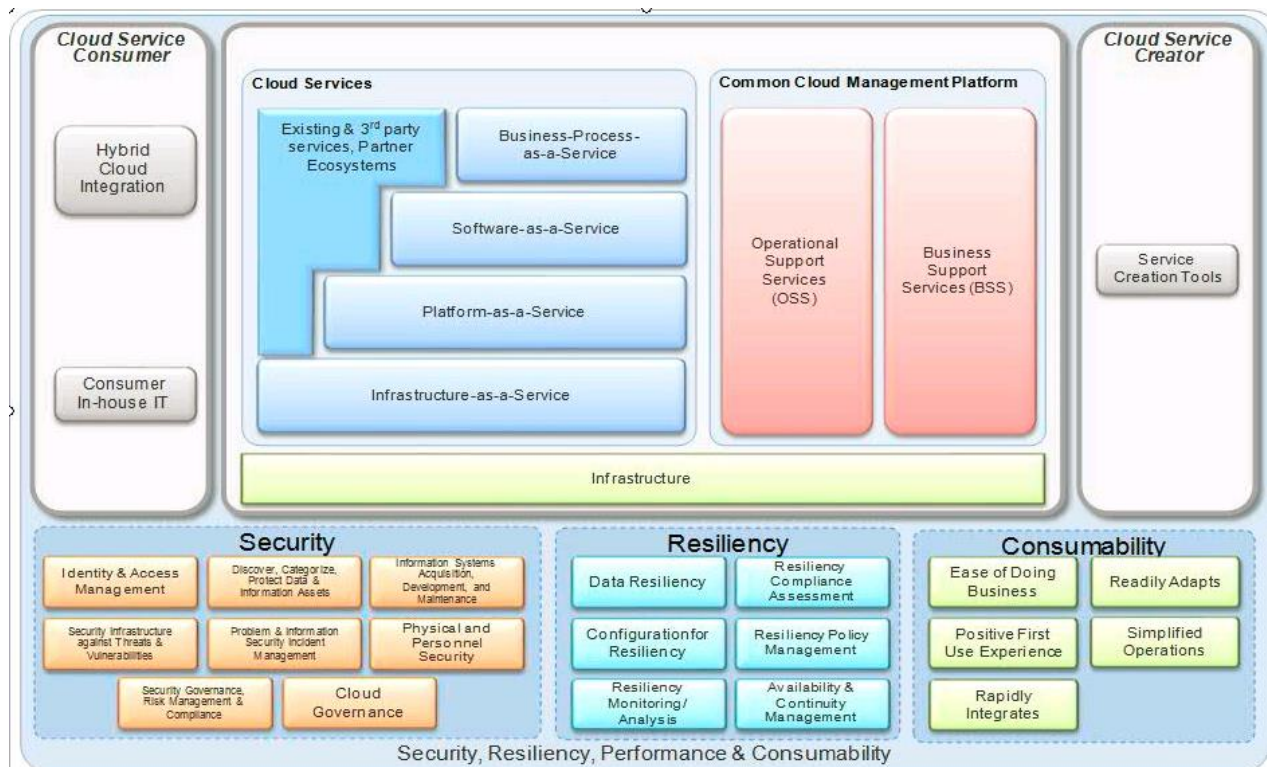
- Grant the least privileges – A user should be limited to the business functions required to perform their authorized activities
- Make maintenance simple – Reduce maintenance labor. Choose the options that can be maintained by lower-cost skills, in fewer hours. Use standard automation tools for common tasks like password resets and job transfers
- Comply with business controls – Build a compliant solution that meets the requirements of internal and external audit, with appropriate separation-of-duties
- Configure with consistency – Apply standards and naming conventions, and use the same approach for SAP hybrid cloud options, by default.

The authorizations for business users are pulled from their activities on the business process models, with the swimlanes representing business roles. Authorizations for the project team start from pre-configured roles we bring in our SAP toolkit. Much of this design is accelerated from our library of reusable role designs for common Finance and HR roles. The result is a simple design with lower ongoing costs.

2. IBM Cloud Computing Reference Architecture

The IBM Cloud Computing Reference Architecture (CCRA) is a blueprint to guide IBM development teams and field practitioners in the design of public and private clouds. It has been created from the collective experiences of hundreds of cloud client engagements and implementation of IBM-hosted clouds.

A Reference Architecture (RA) provides a blueprint of a 'to-be' model with a well-defined scope, requirements it satisfies, and the architectural decisions it realizes. It includes prescriptive architecture and product recommendations in the form of cloud adoption patterns. By delivering best practices in a standardized, methodical way, an RA ensures globally consistent delivery and high quality project results. The diagram below represents our cloud computing reference architecture.



The CCRA provides prescriptive guidance on how to build IaaS, PaaS, SaaS and Service Provider cloud solutions with IBM technology. CCRA categorize the cloud business models and corresponding architectures by the following “cloud adoption patterns” :

- Cloud Enabled Data Center or Infrastructure as a Service (IaaS)
- Platform-as-a-Service (PaaS) adoption pattern
- Software-as-a-Service (SaaS)
- Cloud Service Providers
- Mobile
- Analytics

- Government – Cloud

For each cloud adoption patterns, CCRA identifies:

- Common architecture patterns that describe the business drivers, the use-cases and the technologies for each type of cloud computing implementation.
- Common architecture patterns for items that cut across all the adoption patterns including security, resiliency, performance, etc.

For more information on IBM's CCRA, go to this [link](#).

3. IBM Cloud for SAP Applications Reference Architecture

The following sub-sections provide a high-level overview of the IBM Cloud for SAP Applications Reference Architecture. The focus of the sub-sections is to provide an overview of how this managed offering is architected in accordance with the IBM CCRA.

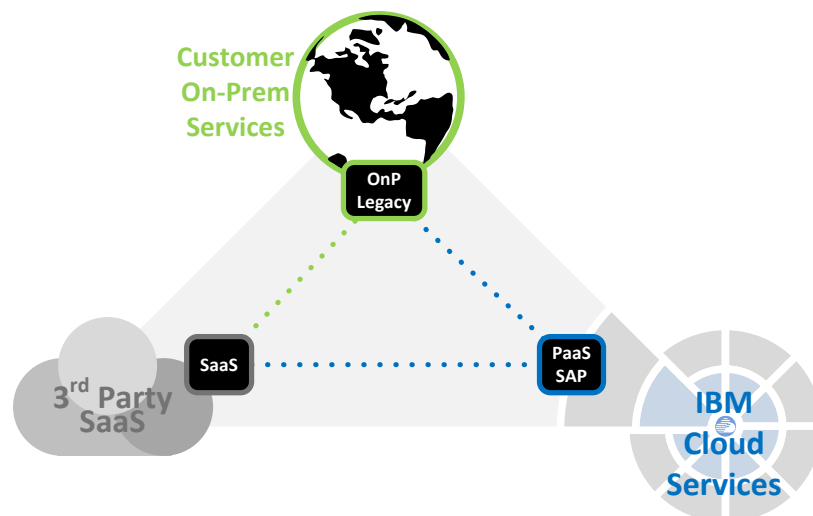
IBM's Cloud for SAP Applications provides standard architectural patterns that provide consumption-based scalability and flexibility to meet our client's business requirements. IBM also provides the capability for custom cloud solutions or hosting, as required by our clients.

3.1 Hybrid Cloud

Hybrid cloud is an environment that integrates IT with a combination of public, private, or managed cloud services. A hybrid cloud is a virtual computing environment that may combine services from a combination of on premise or cloud environments to deliver the right service level and flexibility to meet emerging client requirements. All these services need to be managed as though they were designed to behave as a single unified environment.

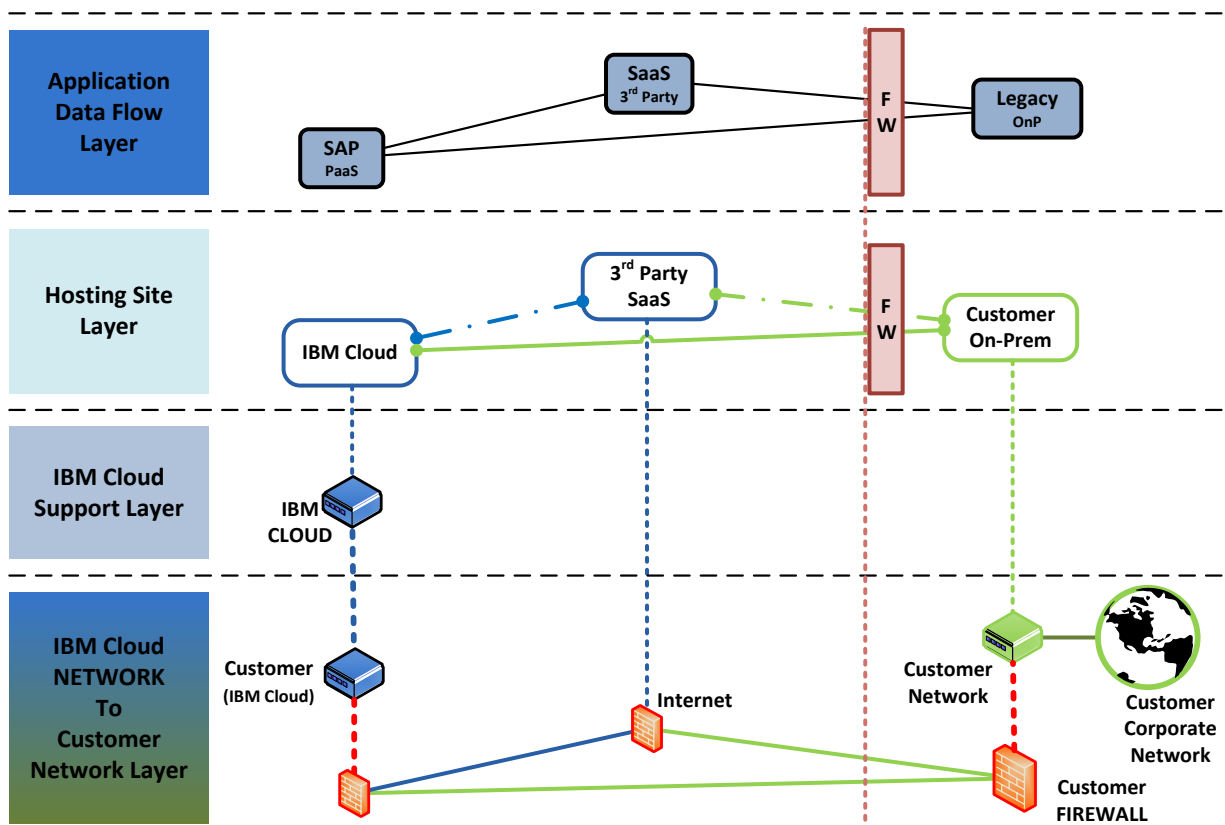
End-users are more concerned with the quality and availability of services than the exact components of the supporting infrastructure. The actual delivery model of services is becoming invisible to the end-user in this environment. End-users are concerned need to know that they can access the right service at the right time with the right service level. This hybrid cloud defines your computing environment and is used to run your business and satisfy the needs of your constituents.

The diagram below shows the standard hybrid cloud model for our clients. Our clients typically have a hybrid cloud model that includes on premise legacy systems, 3rd party SaaS, and IBM Cloud for SAP Applications (SAP PaaS).

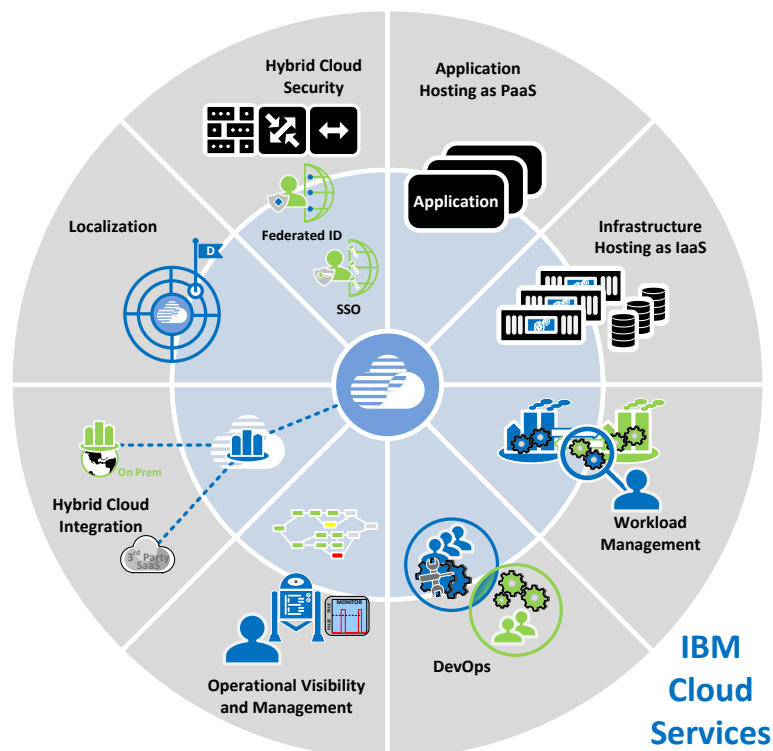


3.2 Hybrid Cloud Layers and Enabling Technologies

Hybrid cloud environments require everything to be connected so the end-user has a seamless experience. The diagram below shows a standard hybrid cloud model with a simplified view of the network and data flows between the client location, 3rd Party SaaS, and IBM Cloud. Integrating leading practices, into our client's enterprise architecture, to keep the flows simple, is key in a hybrid cloud environment.



The IBM Cloud for SAP Applications with advanced project services offering provides resources to work with our clients on defining the detailed architecture for the SAP transformation. The architecture must be in place to enable a hybrid cloud environment to operate in support of business requirements. IBM's point-of-view around these leading practices are outlined in the following subsections. The diagram below represents the leading practices incorporated into the enterprise architecture during an SAP transformation.



3.2.1 Hybrid Cloud Security

Security must be managed in conjunction with visibility and control in a hybrid cloud environment. It also must be managed based on an open governance model. Therefore, a comprehensive approach to security is required to ensure that all the interaction points in a hybrid cloud environment are tightly controlled.

Policies and business rules are needed to understand and monitor information about your workloads. For example, it will be important to determine where a workload needs to be located for either performance or compliance requirements. There's also a requirement to make sure that only authorized individuals are allowed to access and change data. Security is an essential component of the unified architecture for a hybrid cloud. If you have many different services, you need a consistent and predictable way to manage security even if your cloud environment changes.

The increase in connection points adds a multitude of vulnerabilities to the applications and overall IT environment. It is hard for many companies to keep abreast of changing security risks. IBM works with our clients to define and implement the security architecture required by their hybrid cloud environment. Examples include

- Integration with enterprise identity management schemes for SSO and user provisioning
- Managed cloud-to-cloud communication via architecture compliant integration
- Highly secure network connections and encrypted data for in-transit, at-rest and multi-tenant environments

3.2.2 Localization

IBM has clients that require data to be managed locally because of performance and manageability requirements. Some of our clients do not have requirements to broadly share their data. Other clients may have security and compliance requirements dictating the need for data localization. Additionally, many European countries have strict governance rules defining where private data may be sent and identifying countries where the data has passed through on the way to the end-user or system.

3.2.3 Hybrid Cloud Integration

Many of our clients require integration on many levels due to the new generation of dynamic and customer focused applications. IBM works with our clients to integrate data and process in their hybrid cloud environment. Some of our clients require their company to integrate data across their own company and with partner data and public data sources. For example, social media data and third-party data may need to be combined with internal data sources. Additionally, incorporating managed data services such as credit checking or pricing may provide consistency across applications and help companies to meet their customer requirements for speed of delivery. Seamless integration of data and processes must exist across mobile deployments, public clouds, private clouds, 3rd Party SaaS, and traditional data center environments. Providing the capability to analyze this data in real or near-real time can improve insight about customers and grow the business.

3.2.4 Operational Visibility and Management

Our clients want to know that services will operate consistently and predictably. Managing the variety of services that are part of a hybrid cloud requires you to have operational visibility to make sure that all processes, data, and services are working as designed. IBM works with our clients to achieve a process around these services so there's clear visibility so the entire environment can be controlled in a predictable manner. This means being able to monitor and control not just internal services but those services that are owned and controlled by third-party public cloud vendors or managed services providers.

3.2.5 Workload Management

Management tools need to be in place to ensure that the hybrid cloud environment works well to support the business requirements. One of the fundamental differences between cloud computing and traditional computing is the way a cloud is designed to manage workload resources. Managing workloads is foundational to the cloud. Whereas a data center is designed to manage applications, a cloud is intended to manage a pool of resources, which is precisely what it sounds like — a set of shared, configured services that are independent of a physical location. In the 3rd Party SaaS arena, cloud service providers create a multi-tenant environment to support the deployment of these resources. Multi-tenancy enables the sharing of a service while keeping the data and configurations of individual customers separate.

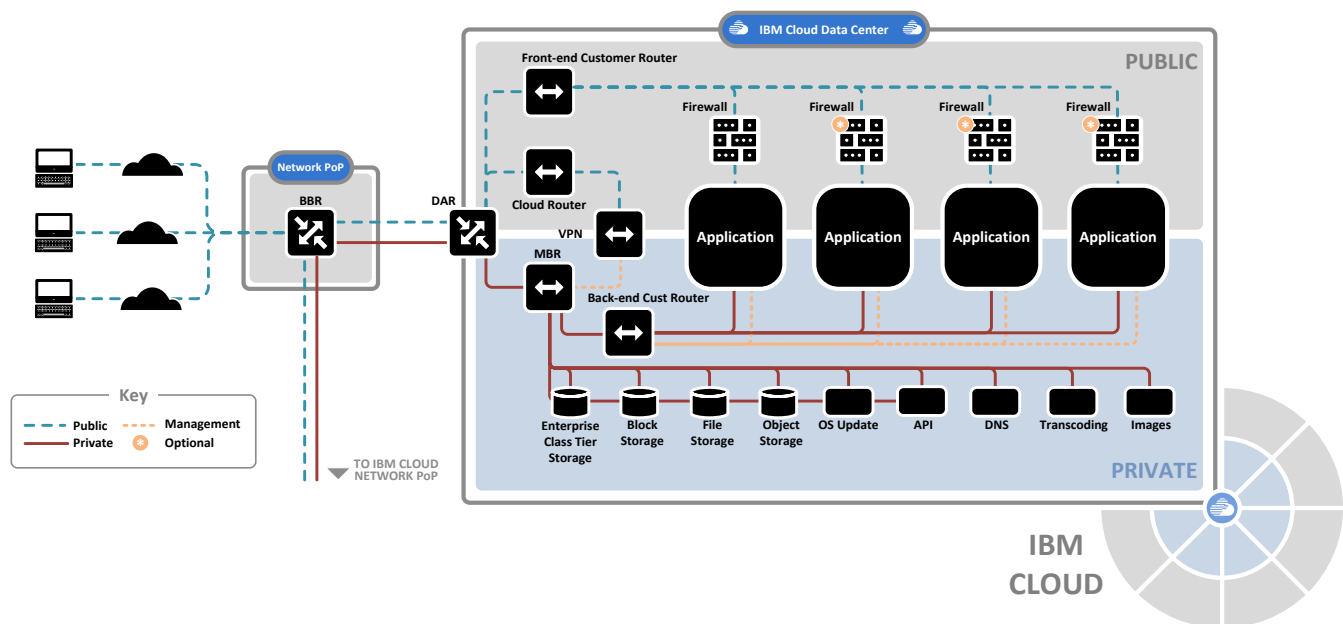
For example, IBM's cloud offers our clients simplification and abstraction so they can simply say, "I need more storage." Those storage resources are pooled together in our IBM Cloud for SAP Applications to create a set of storage resources.

3.2.6 Development and Operations (DevOps) in a Hybrid Cloud Environment

The IBM Ascend Method Powered by SAP Activate™ incorporates agile development and creates a focus on creating a more efficient application life cycle and requires coordination with the hybrid cloud providers. Combining the development and operations is a top priority for our clients. Often referred to as DevOps, this development model must be optimized for the hybrid cloud environment. One of the benefits of the hybrid cloud environment is to help companies quickly compose applications and access the data needed to support these applications. Consistency of outcomes becomes a priority to support the needs of our client's business.

3.3 End User to Cloud Data Center

The diagram below illustrates the logical architectural template for each of IBM's cloud data centers. End-users access IBM's cloud via a regional network point-of-presence (POP). The regional POP provides the entry point to any of IBM's cloud data centers.



Enablement of hybrid cloud workloads can be achieved through high speed (10 Gbps), redundant connectivity between many IBM data centers worldwide. Network traffic from anywhere in the world can connect to closest IBM network PoP or, depending on requirements, directly to Point of Delivery. Inside the data center, we offer up to ten gigabits per second of bandwidth to individual servers to meet even the most demanding network-intensive workloads.

- Inbound bandwidth
- Multiple internet backbone connections
- Automated IP routing and management
- Servers available with port speeds up to 10Gbps
- Geographically redundant DNS

All data centers and PoPs are connected by our private network backbone. This private network is separate from the public network, and it enables you to seamlessly connect your services in our data centers around the world. Move data between servers, and take advantage of our update and patch servers, software repositories, backend services, and more without interfering with public network traffic.

- Secure private VLANs
- Server-to-server cross connects
- Private Local DNS Resolvers
- Centralized storage resources
- Servers available with port speeds up to 10Gbps

In addition to the public and private networks, each server is connected to an out-of-band management network. This management network, allows IBM to access to your server independently of its CPU, firmware and operating system for maintenance and administration purposes.

4. Account Set-up and Onboarding

IBM will enable our client's account and enable access to IBM Cloud for SAP Applications. IBM and our clients collaborate on the questionnaires. Information required for onboarding includes a few questionnaires –

- The Client enablement questionnaire is used for basic client information. The questionnaire includes basic information required for enablement –
 - General – Client name, etc.
 - Client contacts – financial officer, business manager, technical contact
 - Virtual machine information - # of VMs required
 - Network information – IBM internal access requirements
 - Patching requirements
 - SAP HANA device information
 - Overall network connectivity – How will the client connect to IBM Cloud for SAP Applications?
 - Transit subnet information
 - Routing
 - Load balancing
 - Internet connectivity requirements
 - Number of security zones
 - Virtual IP information
 - Active directory information
 - ISM bridging information
 - Firewall information
 - Application alerting services
 - Line of business mapping for VMs
- The VPN enablement questionnaire is used for information related to the VPN installation and contact information for client VPN/Firewall experts.
- The Active Directory questionnaire is used for DNS setup and Active Directory configuration if the platform chosen is SAP on Windows.

4.1 Base Infrastructure

IBM uses infrastructure located at multiple locations to allow localization for our clients. A diagram of the Cloud data centers is referenced in Section 1 of this document. IBM and our client collaborates on the data center location based on our client's requirements. The Cloud data center, selected by the client when ordering the Cloud Service environment, stores content and provides the operational support system for the environment.

For Client's traffic between the virtual machines, IBM provides options based on IBM leading practices at the time of account set-up and onboarding.

4.2 Operational Infrastructure

For each Cloud Service environment, based upon our client's selections in the agreed Pricing Configuration in an Order Document or change authorization, IBM provides on its data centers:

Operational Infrastructure Provided	IBM Cloud for SAP Applications
Operating system licenses including license management	Included
Monitoring the virtual machine availability including operating system up/down status and resource utilization	Included
Storage, including provisioning, administration, operation and problem management of a virtualized and scalable storage infrastructure	Enterprise Class Tier Storage, Block Storage, File Storage, Object Storage
Management of the operating system process and logs files including response to operating system incidents	Included
Application of operating system security and update patches according to IBM standard update schedule and maintenance window, and as needed for critical updates	Included
Virtual machines (VMs) with virtual central processing units (vCPUs) in 64-bit configuration, virtual memory and virtual instance storage	Power Systems and x86 servers
Bare metal servers for SAP HANA with up to 2TB RAM for SAP Business Suite workloads / up to 1TB RAM on Business Warehouse	Included
SAP HANA Appliance up to 6TB for SAP ECC / up to 2TB for single Business Warehouse	Included Scale out possible for selected servers
Monitoring with auto ticketing integrated into event management and into incident-problem-change system	Included

4.3 IBM's SAP Cloud Now

'SAP Cloud Now' is an offering to accelerate SAP system provisioning for short term requirements. The offering includes:

- Standard configurations
- Fixed price
- Short Lead Times for delivery (1-2 weeks)
- Short term non-production use
- BYOL for SAP application and database
- Can be used to jumpstart to move larger workloads to the cloud

5. Supported Software

5.1 Supported OS and Database Software

The following software combinations of operating system and bring your own license entitlement (BYOL) database (DB) software are currently supported. Supported OS and database software versions may change at any time. IBM provides our clients with the latest supported OS and database software versions upon request.

Operating System	DB2	Oracle	HANA DB	Sybase ASE	MS SQL
AIX	Yes	Yes	No	Yes	No
SUSE Linux Enterprise Server for SAP	No	No	Yes	No	No
Red Hat Enterprise Linux	Yes	Yes	Yes	Yes	No
Microsoft Windows	No	Yes	No	Yes	Yes

5.2 Supported SAP Application Software

IBM provides managed services for BYOL SAP applications and releases where the SAP application/SAP component/OS/DB combination is stated in the SAP Product Availability Matrix (PAM). IBM also provides support for non-SAP applications and bolt-ons as part of the IBM Cloud for SAP Applications with advanced project services.

IBM also offers Partner Managed Cloud for SAP. Partner Managed Cloud is packaged and managed SAP solutions, delivered by an OpEx consumption model through IBM's hosted cloud

6. Managed Service Processes

The managed service addresses IT processes provided with the IBM Cloud for SAP Applications offering. The managed service processes are designed to accomplish contractual SLAs. Managed processes include:

- Capacity Planning
- Monitoring
- Path-to-Prod Management
- Performance Tuning
- HA
- DR
- Batch Management
- Bolt-ons & non SAP Admin
- Backup & Restore
- DB Administration
- Configuration Management
- Change Management

The following subsections provide a high level overview of key metrics around the processes supporting the offering. Other metrics are detailed in the contract with our clients.

6.1 Backup and Restore

IBM performs and stores data file backups with the intent of storing the data on duplicated tapes in IBM Cloud data centers (stored in and off site) as described in the backup schedule below. IBM works with our clients to meet additional backup requirements. Restores are performed as required as part of the standard service.

Backup Schedule				
	OS and File System Backup		DB Backup	
	Backup	Retention	Backup	Retention
Non-production	<ul style="list-style-type: none">• Initial full• Daily incremental	35 days	<ul style="list-style-type: none">• 2 full per week• Daily archive logs (3 times a day)	30 days for DB 35 days for logs
Production	<ul style="list-style-type: none">• Initial full• Daily incremental	35 days	<ul style="list-style-type: none">• 2 full per week• Daily archive logs (3 times a day)	30 days for DB 35 days for logs

6.2 Disaster Recovery

RPO is the maximum tolerable period in which data might be lost from an IT service due to a disaster, measured from the time of disaster occurrence. RTO is in general the duration of time within which a business process must be restored after a disaster, measured from the time of disaster declaration.

IBM Cloud for SAP Applications has the capability to provide an Infrastructure RTO of 4 hours and RPO of 15 minutes. The infrastructure RTO and RPO refers to the infrastructure availability prior to the database and application availability. Application RTO refers to the time required to complete application-level disaster recovery processing and deliver the application to the customer. The Application RTO is completely a function of how long it takes to bring up the application, which in some cases may require human intervention. This offering does not provide Application RTOs. Those applications will be recovered but are outside the infrastructure 4 hour RTO.

Metric	Requirement
RPO	Recovery Point Objective (RPO) capability is 15 minutes – The amount of tolerated data loss due to replication latency. As data is transferred from the operational site to the DR site, some data will be queued or in flight as the operational site fails. This metric dictates that the data loss will be less than 15 minutes worth of the most recent transactions. In other words, once operation is restored at the DR site, up to 15 minutes of transactions will have to be re-done to bring the system its pre-disaster state.
RTO	Recovery Time Objective (RTO) capability is 4 hours – The maximum amount of time to restore operational functional at the DR site following the failure of the primary operational site. The time between the decision to transfer operation to the DR site until the time full functionality is restored at the DR site shall be less than 4 hours from the time of the identification by our client and IBM of the disaster.
Replication	Site to site replication bandwidth must be sufficient to move all database logs and file system changes to the recovery site during the peak hour of update traffic to the DR systems within scope.

IBM collaborates with our clients that have additional DR requirements.

6.3 High Availability

High availability in the standard IBM Cloud for SAP Applications offering is available up to 99.9% application availability for production environments. “Availability” or “Available” means all of the following production environment components, as applicable for the selected Cloud Service Environment option, are operating: (1) application, (2) database, (3) operating systems for all servers supporting business critical functions, and (4) the managed network; and a significant number of users can access the system.

6.4 Path-to-Production Management

The Path-to-Production Management process operationalizes the landscape strategy. The result is a client and instance strategy and procedures for promoting/packaging code and configuration throughout the landscape.

6.5 Capacity Planning

IBM collaborates with our clients on capacity planning based on multiple sizing exercises during the SAP transformation using standard SAP methods such as the SAP Quick Sizer™ for estimation and then rightsizing capacity to a consumption based model based on actual system usage. Non-SAP applications and bolt-ons are sized using vendor sizing information and then rightsizing capacity to a consumption based model based on actual system usage.

6.6 Additional Support Services

IBM can provide any additional SAP transformation services to support both establishing a new Cloud Environment or migration of existing Client environments to a Cloud Service Environment as mutually agreed scope and charges.

7. Security Description

7.1 Security Policies

IBM has an information security team and maintains privacy and security policies that are communicated to IBM employees. IBM requires annual privacy and security training for personnel. IBM security policies are revalidated annually based upon industry practices and IBM business requirements. Security incidents are handled based on a comprehensive incident response procedure. IBM maintains physical security standards designed to limit access to authorized personnel at IBM data centers, including limited and monitored access points. Visitors register upon entering and are escorted while on the premises.

7.2 Compliance

IBM performs industry standard audits (or their equivalent) annually in production data centers for compliance of IBM information security policies. The audit report is available to Client and its auditors upon request.

8. Service Level Agreements in IBM Cloud for SAP Applications

IBM provides the following service level agreements (SLAs) as part of our Cloud Service. The following diagram shows the standard SLAs in our cloud service offering. However, our contract with our client provides the contractual SLAs and the associated details.

		SLA's
Availability	99.9 percent – High availability – Optional	Optional
	99.7 percent – Enhanced – Optional	Optional
	99.5 percent – Standard	Included
Service delivery	Severity 1 – First response within 15 minutes	Included
	Severity 2 – 100 percent of responses within 3 hours	Included
	Severity 3 – 100 percent of responses within 2 business days	Included
	Service delivery resolution time within 5 hours (Sev1)	Included
Other	SAP response time : under 1 second (ECC)	Included
	Disaster recovery (SLO) – Optional	RTO= 4 hours, RPO=15 mins (CMS DC's) RTO= 12 hours, RPO=30 mins (SoftLayer DC's)

9. Service Level Objectives for the advanced project services uplift

The following describes the advanced project services team's current Service Level Objectives (SLOs) for the SAP Transformation project. IBM works with our clients to provide services flexibility and quick response to their SAP transformation effort. The following section outlines an example support schedule, example resource availability, service level objectives, and work prioritization process. Our schedule is subject to negotiation based on the requirements of the SAP transformation.

9.1 Example Support Schedule

The support schedule for advanced project services is negotiated between IBM and the client. Transformation projects tend to be dynamic and require flexibility. The following schedule is an example of a support schedule for the transformation.

Day	Start	Stop	Obtaining Support	Support Resources
Sunday – Friday	11:30 p.m. Eastern Sunday	6 p.m. Eastern Friday	Continuous monitoring of Project Services service desk queue.	IBM
Friday – Sunday	6 p.m. Eastern Friday	11:30 p.m. Eastern Sunday	By Request – Request lead times: 5 days for On-Call or On-Site	IBM

9.2 Example Non-Production Transformation Team Activities

The activity schedule for advanced project services is negotiated between IBM and the client. Transformation projects tend to be dynamic and require flexibility. The following schedule is an example of activities for the transformation.

Day	Start	Stop	Obtaining Support	Support Resources
Sunday – Friday	11:30 p.m. Eastern Sunday	6 p.m. Eastern Friday	New System Builds; Prototype Refreshes; Production support refreshes; Developer requests; Outage prep	Defined System Availability; Normal SAP Operation
Friday – Sunday	6 p.m. Eastern Friday	11:30 p.m. Eastern Sunday	Window for Extended Maintenance & offline backups, Hardware maintenance	Systems are unavailable during this time
N/A	N/A	N/A	Planned System maintenance; Support pack application; Plug-ins; Client Copies; System refreshes; system recycles	Outage driven by business and technical requirements. Outages scheduled with business teams based on urgency of maintenance.
N/A	N/A	N/A	On-line backups according to schedule; currently no outage	Possible performance degradation

9.3 Service Level Objectives

The service level objectives for advanced project services are negotiated between IBM and the client. Transformation projects tend to be dynamic and require flexibility. The following list is an example of SLOs for the transformation. SLOs are negotiated between the advanced project services team, the client, and the transformation team. The goal is to provide quick response and flexibility for the transformation.

Activity	Description
Object Key Request	Obtain Object modification key from SAP Service Marketplace
RFC Connection	Establish RFC connection between SAP and other systems – requires USER ID request if connection is not Trusted between SAP systems
Application / Bolt-On Connectivity	Installation of a new connection and / or configuration required to support a new bolt-on component
OSS Note Application	Application of OSS Notes requested to meet the resolution of a specific SAP fault or gap
Open OSS Connection	Open OSS Connection to allow SAP to log into the client's system for researching a problem cited in a client's Customer Message to SAP
Printer Installation	Configuration of a new printer or output device to be connected to an SAP system.
System Performance Management	Analyze SAP system or connected Application or Bolt-On to determine if there is a performance or availability (outage) issue.
Problem Connecting to System	Correct connectivity between user and a client's SAP system or connected Application or Bolt-On.
Schedule Batch Job	Schedule / Run an SAP program or report in Batch.
Data Loads Notification	Prior to large data loads, to request SAP Project Services monitor table space to insure adequate disk / database space remains available to complete load.
Create SAP Customer Message	Create SAP Customer Message
Broadcast Message to SAP System Users (SM02)	Post message for all users of a specific SAP installation.
Open Client for Direct Configuration	Change client settings to allow Client Dependent or Independent configuration for non-transportable configuration (like Number Ranges)
Backup / Restore	Create a system backup before / after a critical step in configuration /

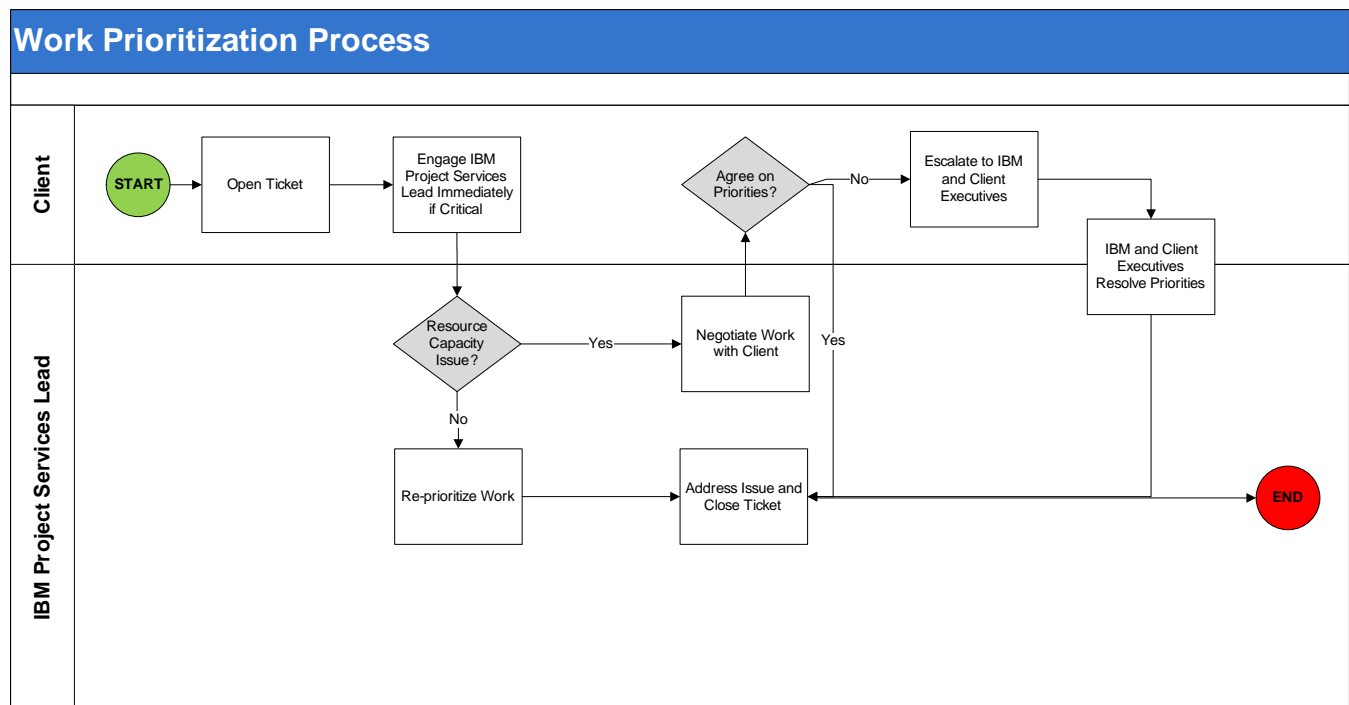
Activity	Description
	development
Emergency Transport Request	Transport approved, released change requests from Development environment to the downstream environments.
Setup of Logical System Names	Logical system name setup for ALE/CIF etc.
Setup of Logical File Names	Logical File name setup for interfaces/archiving etc.
Dictionary settings for Tables and Indexes	Dictionary settings for Tables and indexes
User ID Unlock / Password Reset	Unlock or change password for an SAP User account
New SAP User Account	Create a new SAP User ID Account
Change SAP User Authorizations	Change authorizations assigned to an existing SAP User ID account
Analyze Authorization Error	Analyze an Authorization Error encountered by a SAP User

9.4 Work Prioritization Process for advanced project services

During SAP Transformation projects, the transformation team experiences events that cause work to cease for a subset or all of the team. The issue could be a configuration issue, a systems issue, ABAP dumps, etc. The work prioritization process allows our clients and their systems integrator to have flexibility to prioritize advanced project services work. Additionally, the redirected work effort allows the systems integration team to move forward with the current release work.

The advanced project services team has a capacity limit that must be considered when the work prioritization process is invoked by our clients. IBM provides flexibility under this process to allow our clients to change work direction. However, IBM informs our clients of any schedule impacts based on the change in work prioritization. Any disagreements are escalated to IBM and client executives.

The project flow below describes the basic process. The IBM on-site lead and the client counterpart are encouraged to resolve all issues at their level prior to any escalation.



10. Maintenance

Planned preventive measures for a Cloud Service Environment is carried out by IBM at scheduled maintenance windows as defined in your contract with IBM. The scheduled maintenance windows will be used by IBM only if required to provide the appropriate service quality.

11. Service Desk

IBM will set up and manage a service desk. Client's authorized contacts can contact by telephone to submit and track requests 24 hours per day, 7 days a week. Service desk details are provided in your contract with IBM.

IBM will provide personnel with the appropriate administrative skills with specific knowledge about our client's application environment to provide the in scope services in your contract with IBM. All related communication is in English.