G-Cloud 14 – RM1557.xiii

Lot 3 - Cloud Support

Cloud Consulting and Migration

Service Description

Foreword

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Validity

This proposal and all information contained within are valid for a period of 180 days from October 29, 2024.

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About HCLTech

HCL Technologies, formerly known as Hindustan Computers Pvt. Limited (HCL), is an Indian multinational information technology (IT) consulting company headquartered in Noida. Founded by Shiv Nadar, it emerged in 1991 when HCL ventured into the software services domain.

HCLTech is a global technology company, home to 225,944+ people across 60 countries. Our mission is to supercharge progress for the world's top enterprises by integrating cutting-edge technology with our skilled workforce. Here are some key aspects of HCLTech:

1. Diverse Expertise: We excel in various domains, including Manufacturing, Aerospace & Defence, Financial Services, Telecom, Retail & CPG, Life Sciences & Healthcare, Media & Entertainment, Travel, Transportation & Logistics, Automotive, Government, Energy & Utilities, Consumer Electronics, Healthcare, Cloud, Digital, Engineering, AI, Technology, and Services, and Software
2. Innovation and Risk-Taking: Our journey is marked by four decades of innovation, driven by a strong culture of invention and risk-taking. We constantly strive to push boundaries and create impactful solutions.
3. Customer-Centric Approach: We maintain a relentless focus on customer relationships. Our goal is to provide smarter, better ways for all stakeholders to benefit from technology.
4. Global Reach: With a worldwide network of Research and Development (R&D) centres, innovation labs, and delivery centres, we cater to the traditional, transformational, and future needs of clients across the globe.
5. Technology Solutions: Our expertise spans Digital, Engineering, and Cloud. We leverage these capabilities to deliver solutions that empower businesses to thrive in the digital age.

Service Description

HCL Technologies, a global technology company headquartered in Noida, India, offers a comprehensive suite of cloud services to empower enterprises in their digital transformation journey. Let's delve into the key aspects of HCLTech's cloud offerings:

1. Cloud Strategy and Consulting:
    o Our seasoned consultants collaborate with business and IT leaders to define and deploy a clear path forward for their organisation's cloud strategy.
    o We analyse processes, policies, user behaviours, and platforms to create tailored cloud solutions.
    o Our expertise spans cloud-native development, application migrations, and cybersecurity.
2. CloudSMART:
    o CloudSMART is our adaptive portfolio of solutions designed for continuous modernisation, increased agility, and improved operational efficiency.
    o It aggregates cloud offerings, industry use cases, and best practices.
    o With 40,000 certified cloud professionals, 12,000 cloud assets, and 3,000 industry use cases, CloudSMART ensures value realisation from cloud transformation.
3. Artificial Intelligence (AI)-Driven Operations:
    o Leveraging our DRYiCE Automation and Orchestration platform, we provide scalable on-demand operations for both public and hybrid clouds.
    o Our cloud foundation and build processes adhere to industry-leading standards.
    o The ElasticOps catalogue-based offering enables global shared operations.
4. Global Delivery Focus:
    o We maintain close proximity to customer stakeholders.
    o Offshore teams play a crucial role in optimising Total Cost of Ownership (TCO).
5. Best-in-Class Team and Intellectual Property (IP):
    o Our team brings extensive experience and expertise to ensure a successful cloud journey.
   o We invest heavily in developing internal expertise and creating our own Intellectual Property (IP).

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6. Strong Partnerships:
    o   We collaborate with major cloud vendors:
        ▪   Microsoft Azure: Gold Tier Partner
        ▪   Amazon Web Services (AWS): Premier Consulting Partner
        ▪   Google Cloud Platform: Emerging Partner
        ▪   Pivotal: Strategic Partner

Cloud Operating Model:

• Our tools and processes, initially designed for customer public cloud, can seamlessly extend to hybrid cloud environments in the near future.

HCLTech's commitment to excellence, innovation, and customer success positions it as a trusted partner for organisations worldwide

Cloud Operating Model
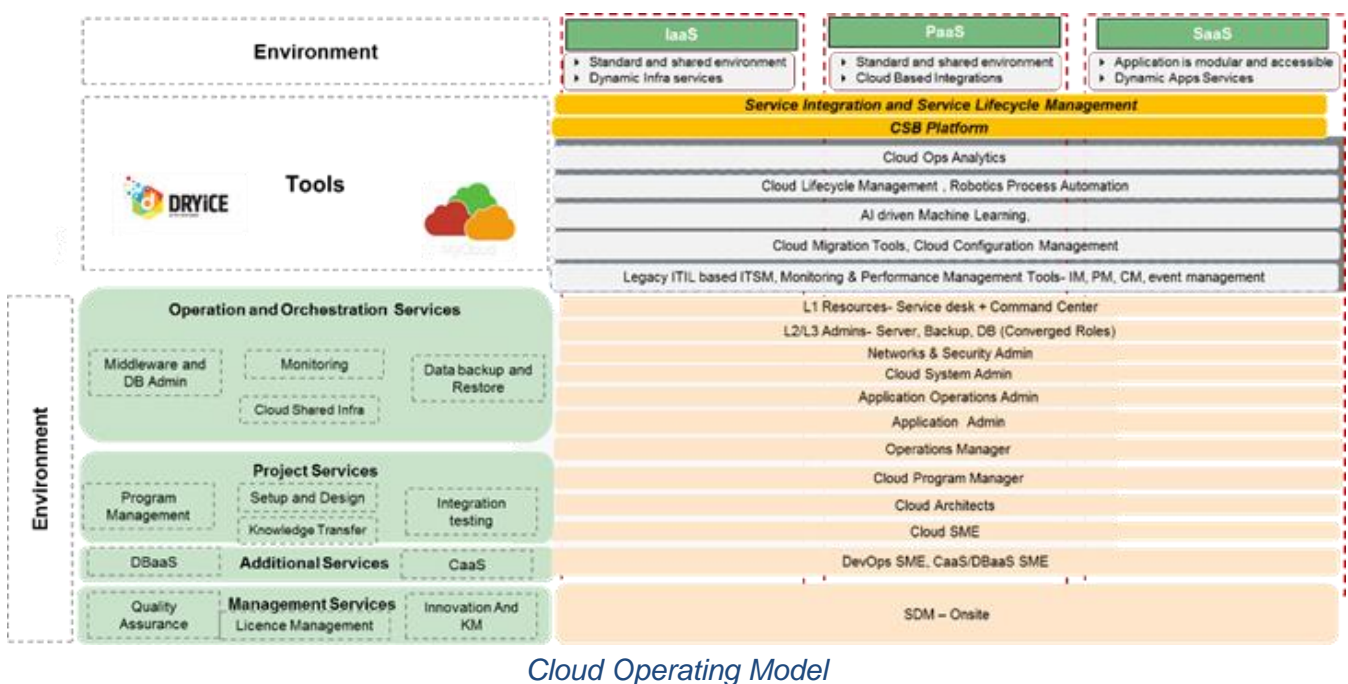
Build Services

HCL Technologies recognises the pivotal role that cloud technology plays in shaping modern businesses. Let's delve into the essence of cloud and its impact:

1. Strategic Imperative:
    o   Cloud is no longer just an enabler; it has become an integral part of business strategy. Organisations across the spectrum, from startups to large enterprises, recognise that a robust cloud strategy is essential for success.
    o   Without a well-defined cloud approach, businesses risk falling behind their competitors and missing out on opportunities for growth and innovation.
2. Cloud Investments and Options:
    o   Cloud investments have surged as companies seek agility, scalability, and cost-effectiveness. The cloud market offers a plethora of options, from public clouds (like Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform) to private and hybrid solutions.
    o   Organisations must carefully evaluate these options to align with their specific needs, compliance requirements, and long-term goals.

3. Holistic View of Cloud:
    o Cloud is not limited to infrastructure, applications, data, or processes in isolation. It encompasses all these elements and more.
    o It is a combination of technology capabilities that empower businesses to innovate, collaborate, and create differentiated products.
    o By leveraging cloud ecosystems, companies can tap into a wealth of services, tools, and resources to drive their digital transformation.

There is a definite need for evaluating the options available in terms of their organisation's priorities, goals and the unique market conditions, along with a rethink on cloud investments accordingly.
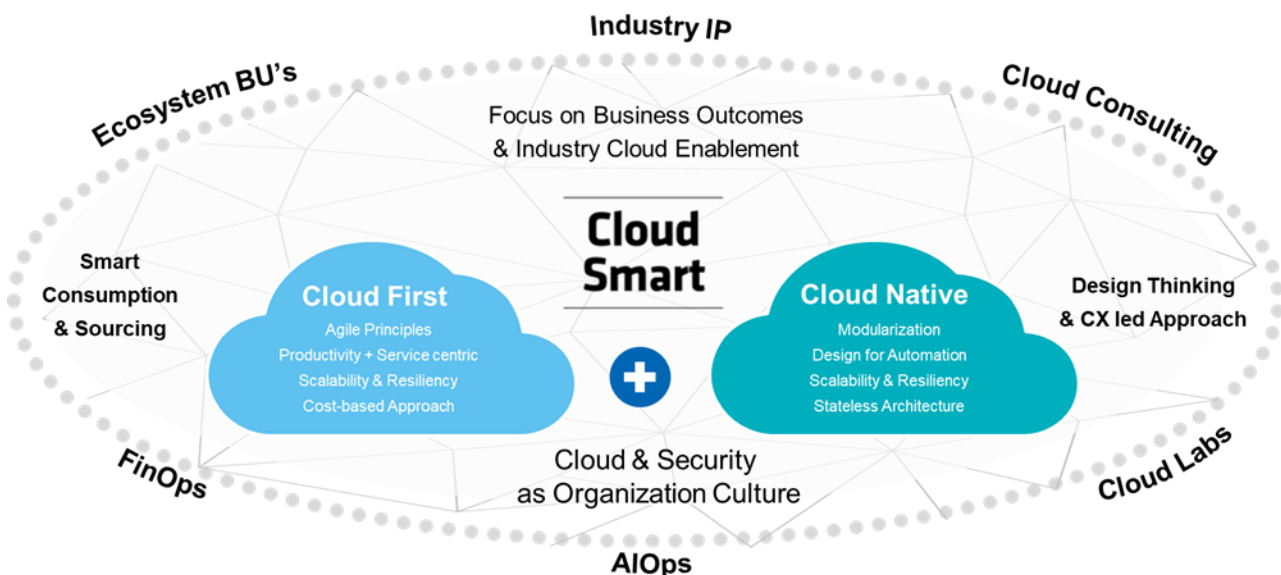
Cloud Smart, HCLTech's strategic initiative, empowers businesses to thrive in the digital era by harnessing the full potential of cloud technology. Let's delve into the key components of Cloud Smart:

1. Dedicated Ecosystem Business Units (BUs): These specialised units focus on leading hyperscalers, fostering innovation, and co-investing in market-aligned solutions. By collaborating closely with hyperscalers, HCLTech ensures depth and relevance across its offerings.

2. Cloud Consulting Framework: This framework facilitates an industry-specific cloud strategy. It is not a one-time exercise but an ongoing process. Customers receive continuous guidance to adopt vertical solutions and optimal products, aligning with their unique cloud journey.
3. Industry-Aligned Intellectual Properties (IPs): HCLTech continues to cultivate vertical and horizontal IPs. These assets enhance industry-specific solutions, drive efficiency, and accelerate transformation.
4. Integrated Point of View (POV): Leveraging Cloud Native labs, HCLTech collaborates with customers to create a unified perspective. This approach ensures seamless technology adoption and alignment with business goals.
5. AIOps Discipline for Day 2 Operations: By embracing AIOps (Artificial Intelligence for IT Operations), HCLTech enhances operational efficiency, automates processes, and optimises cloud management.
6. Cloud FinOps: This journey focuses on cloud consumption and spend optimisation. HCLTech assists enterprises in managing costs effectively while maximising value from their cloud investments.

Public Cloud Migration:

1. Holistic Migration Approach:
   o Workload migration isn't merely about relocating servers; it involves a comprehensive understanding of business criticality, interdependencies, and application interfaces.
   o We recognise that migrating to the public cloud impacts not only the application itself but also its interactions with other enterprise and business systems.
2. Cloud Accelerate Framework:
   o To ensure successful cloud adoption, we have developed the Cloud Accelerate framework. This standardised approach guides organisations through a process-driven migration journey.
   o The framework consists of four phases, each playing a crucial role in the migration lifecycle:
      ▪ Explore: In this phase, we thoroughly assess the existing environment, identify dependencies, and understand business needs. It is about gaining clarity on what needs to be migrated and why.
      ▪ Analyse: Here, we dive deeper into the technical aspects. We evaluate infrastructure architecture, performance requirements, security considerations, and compliance needs. Data analysis and risk assessment are key components.
      ▪ Craft: Armed with insights from the previous phases, we design a tailored migration plan. This includes selecting the right cloud services, defining the migration strategy (lift-and-shift, re-platforming, or re-architecting), and creating a detailed execution plan.
      ▪ Transition: The actual migration takes place during this phase. Automation and analytics engines play a crucial role in ensuring a smooth transition. We closely monitor progress, address any issues, and optimise as needed.
3. EXACT Methodology:
   o Our framework aligns with the EXACT methodology:
      ▪ Explore: Understand the landscape.
      ▪ Analyse: Dive into the details.
      ▪ Craft: Design the solution.
      ▪ Transition: Execute the migration.
4. Long-Term Success:
   o Our goal is to ensure that businesses adopt the cloud successfully and reap its benefits over the long term.
   o By combining process-driven approaches, automation, and analytics, we guide organisations toward a cloud environment that enhances agility, scalability, and efficiency.

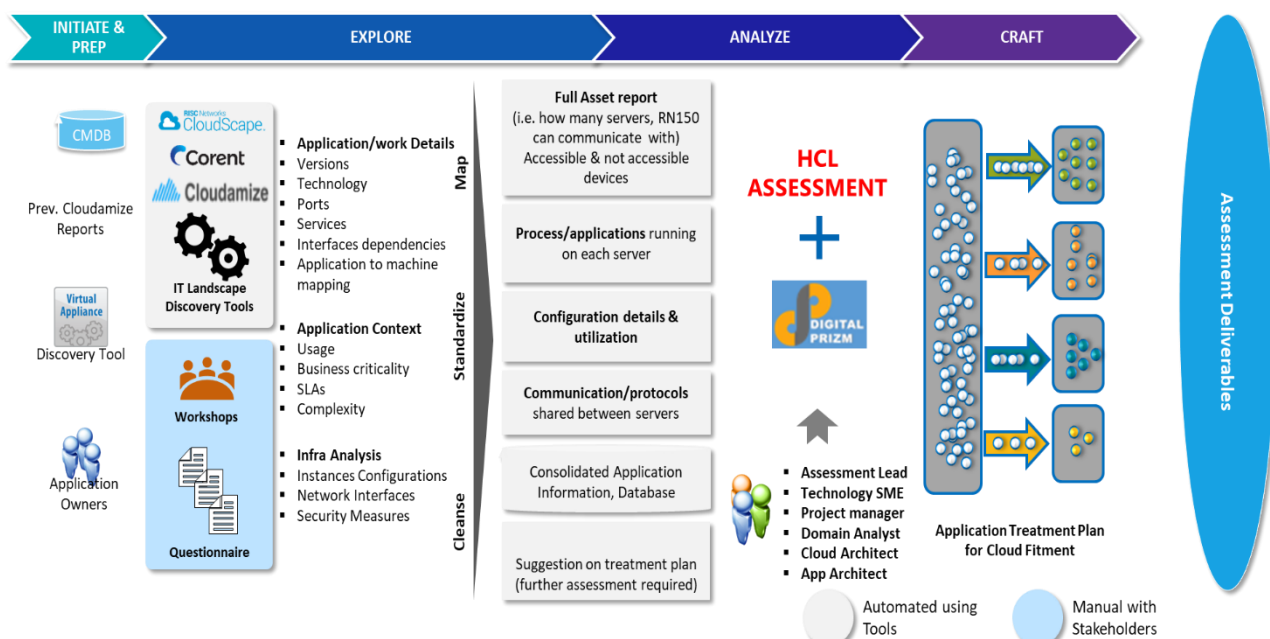A view of the framework along with a brief description of its phases is provided below.

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Figure: Public Cloud Migration Framework

Phase 1 - Explore

This is the entry point of HCLTech's Cloud Accelerate framework where the existing environment of customer will be discovered, and various business and application dependencies will be mapped for cloud readiness assessment.

The key aspects of this phase are to achieve following objectives.

- Crystalise Migration goals
- Business requirements
- Define Guiding principles.

Phase 2 - Analyse

Once we have discovered and normalised the customer IT environment with filtered list of applications and associated data along with workload portfolio capture, we will bring in our in-house developed DPrizm tool for an in-depth application portfolio assessment in phase 2 for cloud portability.

Dprizm - Machine Learning based Automated Assessment

Dprizm is a HCLTech's proven and standardised assessment tool that enables the CRI framework and is used as advisor and decision assist. It is also used as Cloud fitment of applications and gap assessment for cloudification journey.

The diagram below depicts this integrated CRI approach of the Dprizm for application correlation, Analysis and Migration Planning.
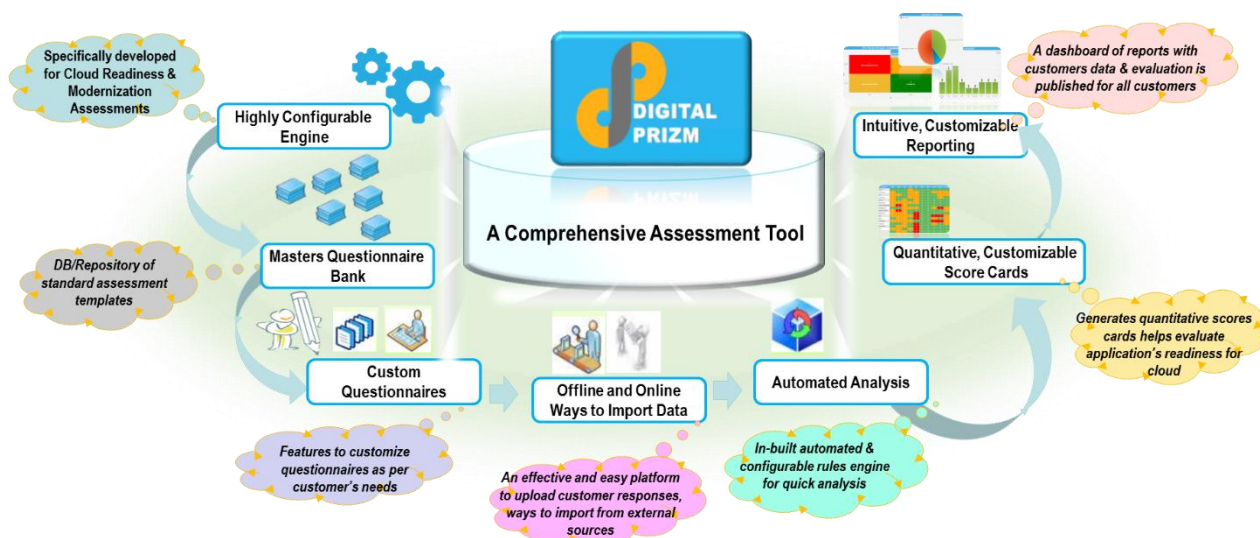
Integrated CRI approach of the Dprizm for application correlation, Analysis and Migration Planning

The Dprizm tool brings machine-learnings to data gathering, analysis and planning of migration of a large number of applications. DPrizm complements several commercial tools. It integrates the information from multiple sources, then analyses and creates a plan.

Specifically, it brings the following efficiencies:

- It integrates information from multiple sources, CMDB, application discovery tools, and questionnaires
- It also uses machine learning to create default values for most applications, based on patterns it automatically identifies.
- It makes it easy to work with a group of applications in gathering the information, in creating a treatment plan, in creating a business case.
- Since different organisations have different target operating models and different tolerance for risk, we let them run what-if scenarios to create the plan that meets their constraints.

Phase 3 - Craft

In this phase HCLTech would focus on migration planning which would include analysing current deployment architecture, applications/ infrastructure key dependencies constraints and risks. This phase will lead to outcomes like low level designs (LLD), move groups and migration plans. The following activities will be conducted as part of the Craft exercise:

- Mapping business requirements to Cloud adoption
- Prepare detailed migration plan basis outcome of analyse phase for Go/ No-Go candidates
- Migration Wave Group planning with details like application dependencies, treatment plans and execution venues
- Prepare Total Cost of Ownership for Cloud adoption
- Target cloud deployment model including solution architecture and instance recommendations.

Phase 4 – Transform (Migration Execution)

After the craft phase, the workloads are handed over for migration to HCLTech's Cloud migration factory which is geared towards establishing an assembly line of activities that are driven by process, tools and specialised resources.

As part of a real work experience, a Unified Cloud Migration Framework has been defined with a factory-based approach to drive the application migration to Public Cloud. This can be treated as a systematic approach for migration cloud applications from on premise to cloud platform in a sustainable manner.

Given the multitude of issues and challenges that occur during the cloud migration phase, this factory approach proposes a novel framework that helps Subject Matter Experts (SMEs) to master migration related impediments.

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Firstly, the work considers SME specific requirements and articulates their importance during the cloud provider selection phase. The results demonstrate those factors such as security, reliability, cost, performance as well as flexibility and service and support have a pivotal role to play and require close attention.

Secondly, decisive attributes are defined that qualify business components and services as cloud-fit.

Finally, the framework itself is proposed, which focuses on a systematic service-oriented approach and helps companies to analyse their existing business processes during cloud migration. The framework is verified in its practicability using a concrete scenario and a subsequent prototypical cloud implementation.

Based on the customer's migration objectives, HCLTech develops a plan that defines the scope, target environments, metrics and governance of the application migration.

HCLTech's method takes the following principles into account:

- Migration of applications can be unbounded activity. Through planning and governance, we make it bounded activity.
- Standardised method customised to individual client objectives
- Migration approach with maximum reusability and minimum disruption
- Different applications need to be migrated differently, even if they are technically similar. Considering that there is a great variation in the way applications use cloud, there are business reasons why we would want to migrate applications to support better cloud ops. Obviously, dissimilar technical characteristics force different approaches to migration.
- Evaluating the success of migration based on business parameters: cost, risk, Return on Investment (ROI), and timelines of implementation.

It will need a wide variety of skillsets and resources. HCLTech's Migration Factory is based on the following tenets:

- **Standardised** - Process, Technology, Quality Control is standardised
- **Predictable performance** - time, cost and quality is predictable
- **Scalable operations** – Since it is a factory approach it can be scaled to many apps.
- **Measurable** – Metrics driven delivery
- **Repeatable process** - Leveraging continuous learning
- **Transferable process** - Can be replicated in other business units, geos
- **Zero Disruption** – Minimal or zero disruption to Business

HCLTech's Cloud Factory Model is a robust structure which aligns business and IT stakeholders around a target set of process metrics that will be favourably impacted by the transformation to a highly automated and industrialised cloud operating model. Such a measurement framework is an essential means of communicating the value proposition for multi-cloud platform migration factory.

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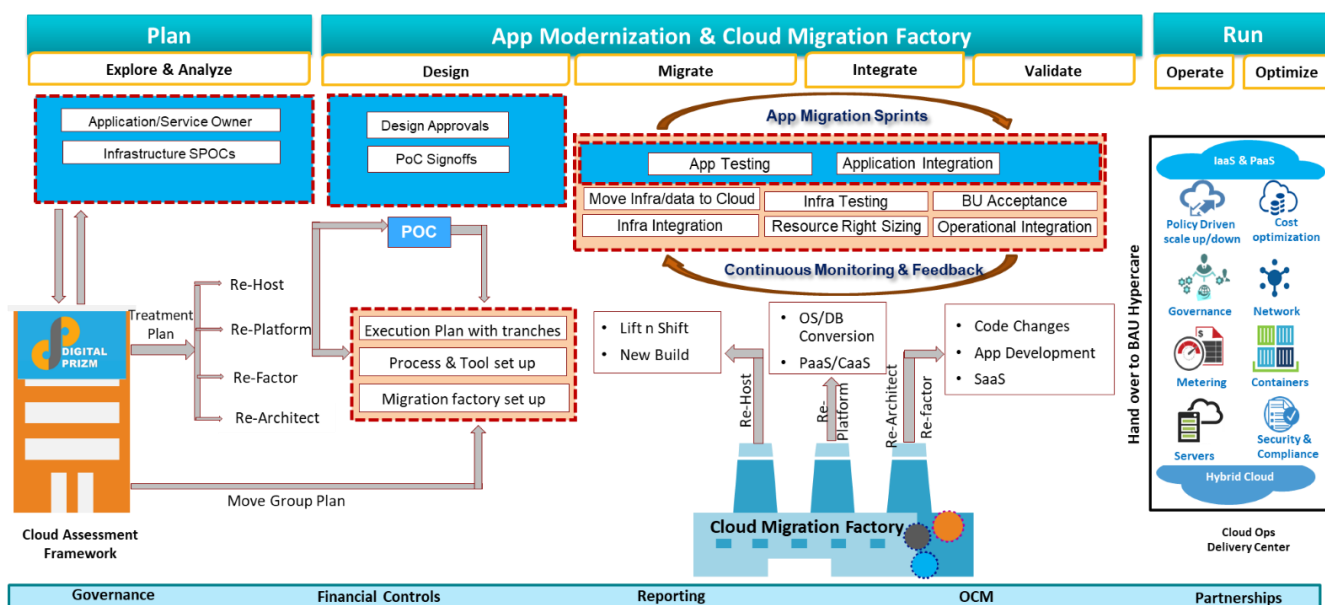
Multi-cloud platform migration factory.

HCLTech will leverage cloud migration tools available from Cloud providers to migrate workloads from on-premise to cloud using the best feasible methods like P2C, V2C or by creating standard templates for provisioning and migration workflow to automate the entire process.

Data migration would be performed over the WAN/ Internet for small to medium workloads and for workloads which have large data attached, we will leverage cloud service provider options like Import/Export, Azure Data Box, etc.

Our approach towards migration is to adopt a factory model of migration. This comprises of multiple strategies/ work packages for application workload migration assuming minimum refactoring (Lift and Shift approach) and driven by process, tools and specialised resources.

After application complexity and interdependencies are determined, services will be grouped together in Migration Waves. The HCLTech team will build the foundational services like Active Directory (AD), Domain Naming Service (DNS), and File services, along with the required security configurations, before migrating any workloads to Public Cloud.

Run Services

HCLTech recognises the critical importance of efficient and effective **Run Services** in the cloud. Let's delve into the details of our **ElasticOps** model:
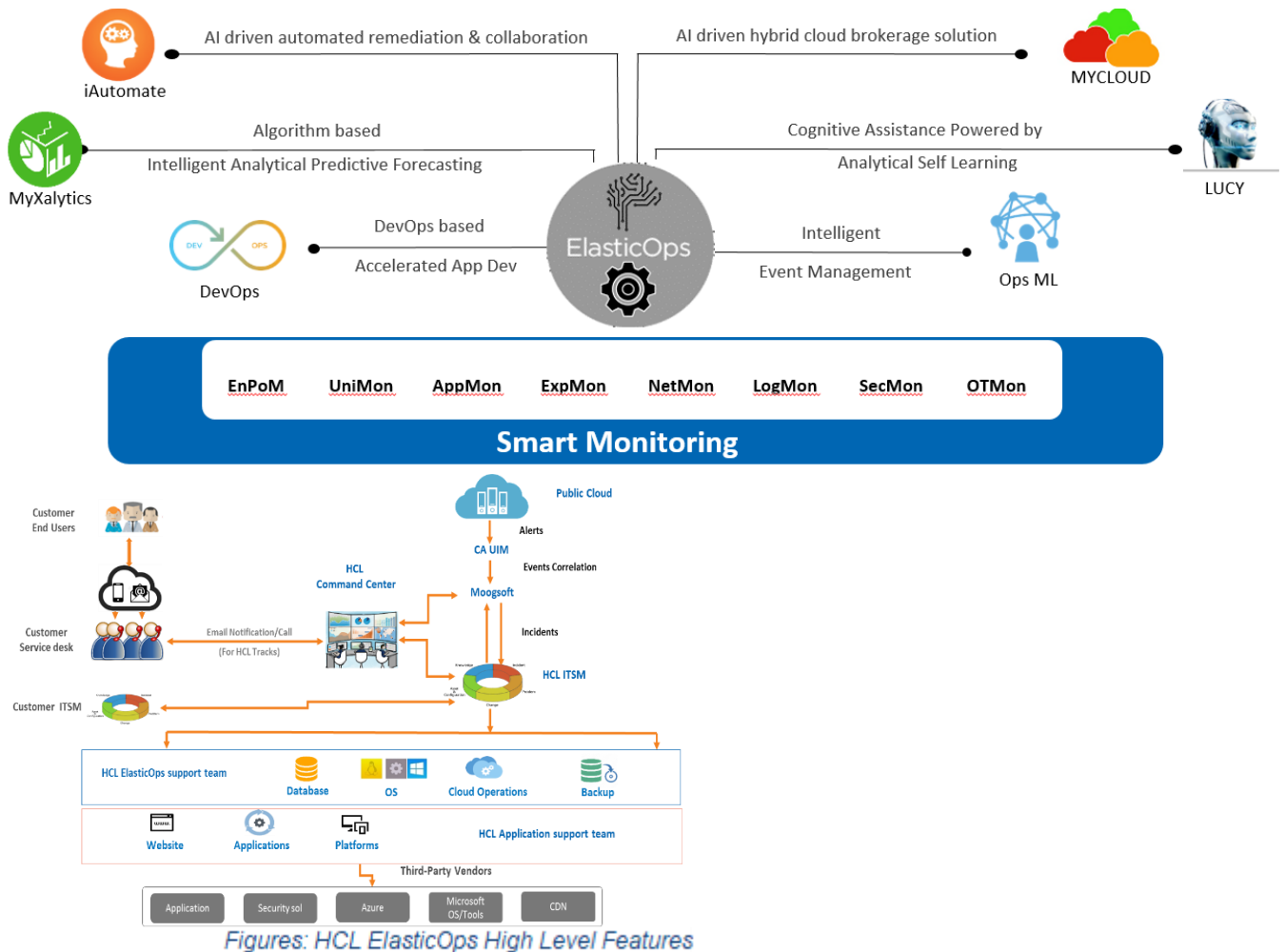
1. Elastic Operations (ElasticOps):
   o ElasticOps is an AI-driven approach to managing cloud operations. It combines leveraged resources, best-of-breed tools, and a proprietary unified reporting platform.
   o Our goal is to provide enterprises with a comprehensive solution that ensures agility, continuous modernisation, and operational efficiency in the cloud.
2. Key Features:
   o Leveraged Resources: We optimise resource utilisation by intelligently allocating and managing cloud resources. This ensures cost-effectiveness and scalability.
   o Shared Enterprise Management Toolset: Our toolset includes industry-leading solutions for monitoring, security, compliance, and performance management.
   o Unified Reporting Platform: We provide real-time insights into cloud performance, cost, and compliance. This transparency enables informed decision-making.
   o Best Practices: Our approach is based on proven best practices across Governance, Operations, and Technology domains.
   o Service Catalogue: We offer a well-defined service catalog with published SLAs and utility-based pricing.

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3. Utility-Based Model:
   - o ElasticOps is available to customers on a utility basis. This means you pay for what you use, aligning costs with actual consumption.
   - o Whether you need to manage a single workload or an entire cloud environment, ElasticOps adapts to your needs.

Figures: HCL ElasticOps High Level Features

Let's delve into the key aspects of HCLTech's ElasticOps model:

1. Cross Leverage:
   - o The ElasticOps model brings the benefits of a leveraged resource model.
   - o It fosters cross-pollination of learning and experience across teams.
   - o By reducing dependence on specific individuals, it ensures continuity and knowledge sharing.
2. Scalability:
   - o ElasticOps enables high responsiveness to changing business requirements.
   - o Customers can scale their environments up and down as needed.
   - o This adaptability ensures agility and cost-effectiveness.
3. Best-of-Breed Tools:
   - o HCLTech leverages a large pool of skilled resources.
   - o Our DRYiCE framework provides industry-leading tools for automation, AI, machine learning, and predictive maintenance.
   - o These tools operate on an on-demand basis, enhancing operational efficiency.

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4. Unified Reporting with MyXalytics:
    o HCLTech MyXalytics is our Intellectual Property (IP).
    o It offers complete visibility across different layers of IT infrastructure.
    o Customers benefit from an integrated view of all managed services.
5. Quality Assurance with Gold Standard Framework:
    o Our HCLTech Gold Standard framework incorporates best practices in governance, operations, and technology.
    o It ensures consistent service quality and adherence to industry standards.

Additionally, our AI-driven Cloud FinOps Visibility and Insights product helps you manage and optimise multi-cloud spending:

- Unified Cloud Cost Visibility:
    o Gain granular visibility into all your cloud environments.
    o Track usage patterns over time.
    o Leverage AI and Machine Learning for accurate budget forecasting.
- Cost Anomaly Detection:
    o Use AI-driven outlier analysis to identify anomalous cloud costs.
    o Receive automated alerts via channels like ITSM, Slack, and ChatOps.
- Cost Optimisation:
    o We recognise that efficient cloud spending is crucial. Our approach includes techniques such as:
        ▪ Rightsizing: Adjusting resources to match actual workload needs.
        ▪ Scheduled Instances: Optimising usage based on predictable schedules.
        ▪ Reserved/Committed Usage Instances: Leveraging cost-effective reserved instances.
        ▪ Waste Elimination: Identifying and eliminating unnecessary resources.
- Cloud Governance:
    o Ensuring continuous security, compliance, and governance across cloud environments is paramount.
    o Our native advisory services and security visibility tools help maintain a secure and compliant cloud ecosystem.
- Task Allocation and Tracking:
    o We analyse and identify areas that need attention.
    o Concerned teams are assigned tasks for resolution, with continuous tracking and updates.

DevOps:

- While addressing immediate build and run services, we also consider the long-term Cloud First Strategy.
- Our proposed solution integrates with DevOps practices.
- We create a roadmap for Continuous Improvement (CI)/Continuous Development (CD) pipelines and an Integrated Platform Operations (IPOC).
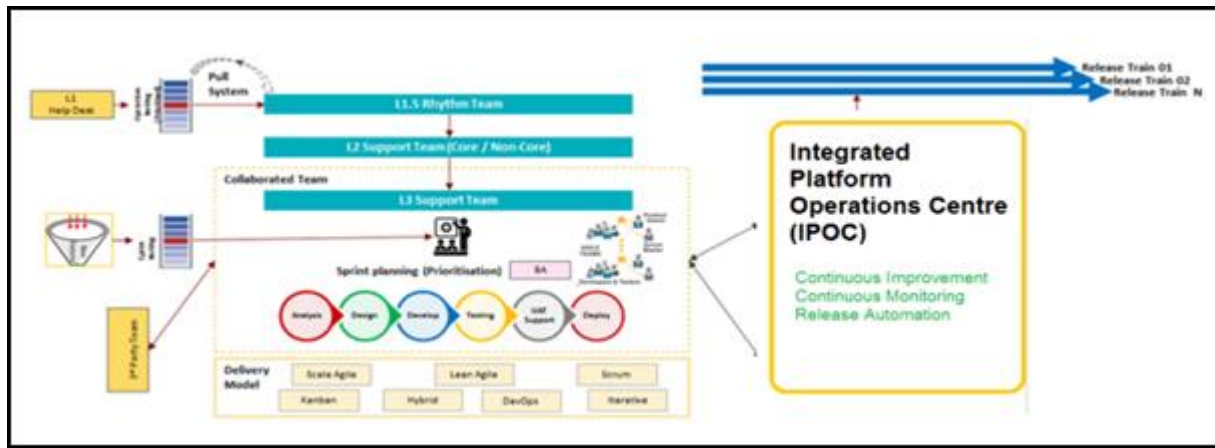
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Figure: HCLTech's Integrated Platform Operations (IPOC)

Security services

HCLTech believes that Security is one of the most important attributes for an organisation that is planning to go big on Cloud. Keeping that in mind we have given a major focus on ensuring that our solutions are covered from the Governance, Risk and Compliance (GRC) perspective. HCLTech supplies a robust security framework with well-defined tools and process.

Features

- Cloud Adoption Strategy Sessions and Roadmap: clarify your drivers for cloud adoption and turn these into a benefit enabled roadmap.
- Requirements Analysis and Solution Selection: enables us to understand your user needs and how solutions can best meet these needs.
- Business Case Definition: work with clients to identify and create a compelling business case focused on business benefits, productivity savings and cost reduction.
- Enterprise Architecture Definition: review your existing technical architecture and create a design that best aligns to current technical constraints and future IT roadmap (helping you develop one if not already in place).
- Cloud Adoption Impact Assessment: assess the positive and negative impacts of transferring applications and services to the cloud.
- Application Readiness Assessment: identify which applications and services can be moved to the cloud and which should remain on premise.
- Training Needs Analysis and Training Delivery: assess business training needs and deliver training solutions that best meet these needs.
- Stakeholder Engagement: develop and manage an effective stakeholder engagement strategy.
- Business Change and Communications: work with key business areas to identify use cases, business change requirements and develop and deliver a communication plan to support adoption.
- Project/ Programme Delivery: using specialist resources to develop and execute a delivery plan to successfully enable adoption and benefits realisation.
- Service Transition: work within the existing service transition framework to ensure that the solution is successfully transitioned. Also, that appropriate service delivery artefacts and Business as Usual (BAU) roles and responsibilities are in place.
- Support: Assess user support needs and the required BAU support model. Then either provide a helpdesk function or integrate support into the existing service desk function. With training and knowledge base articles.
- Service Integration: Either working within the existing service integration function to ensure that the integration Operational Level Agreements (OLAs) are in place or operate the Systems Integration (SI) function on behalf of the client.

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Benefits

- Cost Optimisation and ROI Maximisation:
  - We focus on reducing run costs while ensuring maximum Return on Investment (ROI).
  - Our strategies involve efficient resource utilisation, rightsizing, and cost-effective cloud services.
- Efficiency in Delivery and Onboarding:
  - We streamline processes to reduce delivery time, minimise risks, and enhance efficiency.
  - Our goal is to make cloud adoption seamless and effective.
- Innovative Technology Solutions:
  - We provide simple yet innovative solutions that align with your business needs.
  - Our expertise spans cloud-native development, AI, and modernisation.
- Business Change Enablement:
  - We create creative solutions that facilitate business change and adoption.
  - Our focus is on realising benefits through technology transformation.
- Encouraging Innovation through Collaboration:
  - We foster a collaborative environment that encourages innovation.
  - By working closely with our clients, we drive meaningful change.
- Supporting Digital Transformation and Cloud-First Adoption:
  - We recognise the importance of digital transformation.
  - Our solutions align with the cloud-first approach, enabling agility and scalability.
- Successful Project Delivery:
  - Our track record includes impressive project deliveries across industries.
  - We understand the intricacies of cloud-based solutions.
- Continuous Learning and Adaptation:
  - We constantly review new cloud capabilities and developments.
  - Our recommendations and designs evolve to incorporate the latest advancements.
- Embracing Cloud Services:
  - Our solutions seamlessly integrate cloud and on-premise components.
  - We manage interdependencies and constraints effectively.
- Realising Cloud Benefits with Sustainability in Mind:
  - Our approach ensures that your business realises cloud benefits.
  - Sustainability is a core consideration in all our solutions and services.

Technical Specifications

HCLTech Cloud Services cater to all the Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) services.

Implementation

HCLTech implements services on Cloud consulting strategy, assessment and application migrations, Cloud native development, Cloud platform operations, Software as a Service (SaaS), cybersecurity and end to end programme management. The effort and timeline for implementations depends on the customer requirements.

Support Arrangements

- ElasticOps - Fully offshore shared support model
- Dedicated model - Onsite/ offshore support model with dedicated people
- HCLTech provides 24*7 managed services support.

Business Continuity/ Disaster Recovery

HCLTech is responsible to ensure assured and continued service delivery (Service Continuity) of the contracted services to customers and its 3rd party vendors with regards to the SLA obligations.
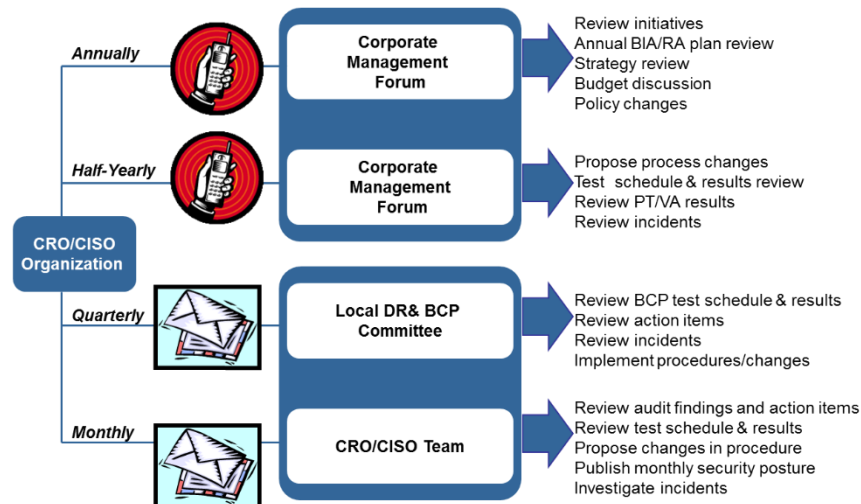

To achieve this HCLTech has defined Service Continuity Management (SCM) Framework to supplement Business Continuity and Disaster Recovery drills as per the criticality of respective System/Application and impacted processes. BCP/DR tests would be conducted broadly as per following frequencies based on criticality and risk posed.

- Quarterly
- Semi-Annual
- Annual
- Bi-Annual

Details of our SCM (Supply Chain Management) services are listed below:

- Orchestrating Supply Chain Excellence for a New Era:
    - In today's rapidly evolving digital landscape, organisations require a comprehensive and agile approach for their supply chain and operations strategy.
    - Our SaaS services help businesses grow, optimise, and safeguard their operations by seamlessly integrating a digital supply chain across every facet of their end-to-end processes.
- Leveraging Cutting-Edge Technologies:
    - HCLTech's SCM practice leverages cutting-edge technologies, including AI, big data, predictive analytics, and digital control towers.
    - We deliver robust solutions that drive operational excellence and resilience.
- Comprehensive Suite of Services:
    - Our solutions focus on:
        - Integrated Business Planning: Achieve strategic goals and profitability across the value chain.
        - Demand Planning: Predict product demand accurately.
        - Supply Planning: Optimise supply chain operations.
        - Warehouse Management: Improve productivity and reduce costs.
        - Transport Management: Streamline goods movement.
        - Procurement: Strategically manage global supply chain networks.
- Partner Ecosystem and Success Stories:
    - We collaborate with partners and have successfully enhanced supply planning.
    - Our goal is to make your supply chain resilient, sustainable, and future-ready.
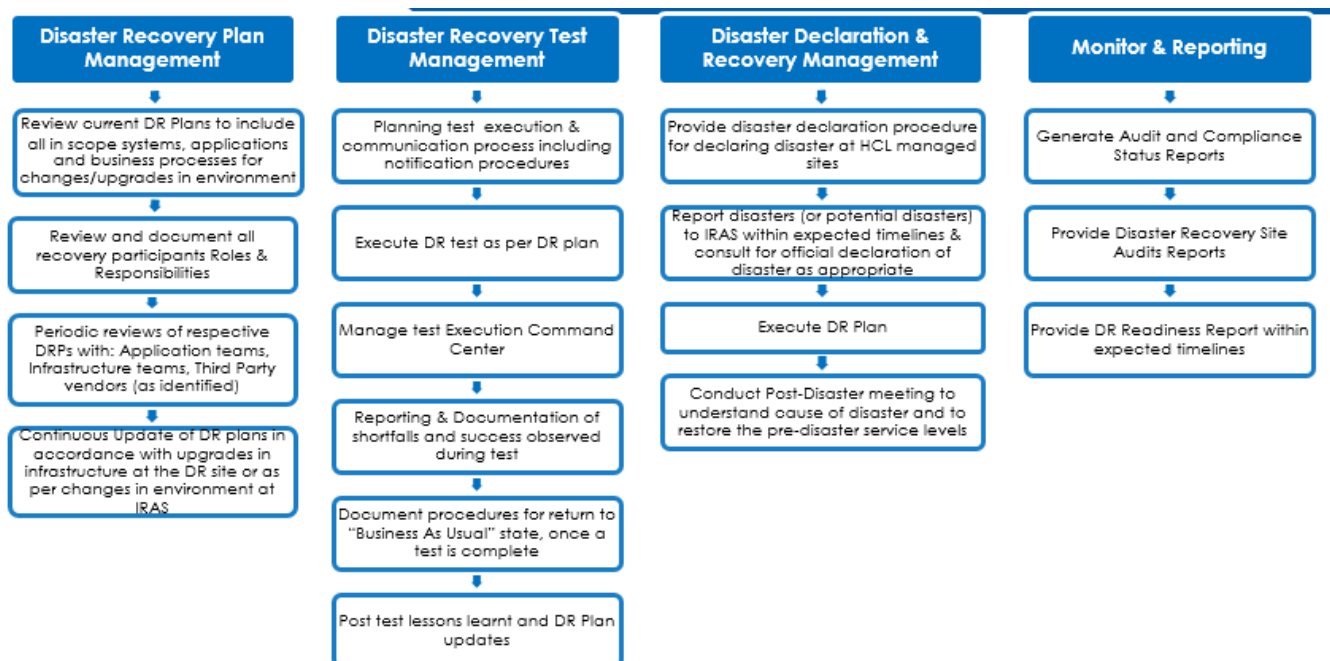
HCLTech's IT Service Business Continuity and Disaster Recovery Operations

Analysis and Review:

As part of the BC/ DR 'Analysis and Review' phase HCLTech will perform assessment of the IT environment in detail. The key outputs of this phase will be:

- Reviewing/ defining the BC objectives
- Reviewing/ defining BC/ DR policy
- Identifying criticalities of business process and its workflow (s)
- Reviewing/ defining business functions and the application dependency matrix
- Threat identification and Risk Assessment
- Conduct Business Impact Analysis (BIA) and
- Identify Recovery Time Objective (RTO) and Recovery Point Objective (RPO).

Design and Implementation:

As part of the BC/ DR design and implementation phase, HCLTech will determine and guide the selection of appropriate recovery strategies that address the overall Business Continuity/ Disaster Recovery objectives and develop plans and procedures for sustaining critical business processes and IT infrastructure. The key outputs of this phase will be:

- Review/ design the DR solution architecture
- Develop Business Continuity Plan and procedures
- Develop Disaster Recovery Plan and procedure
- DR Testing (drill test, communication test, DR test, etc.)
- Validation of the test observations and plan revision recommendations
- BCM training and awareness programme.

Sustenance and Support

The BC/ DR sustenance and support phase is intended to maintain the proposed Business Continuity and Disaster Recovery Plan for its viability and practicality and identify areas of improvements, then revise the plan if required. The key outputs of this phase will be:

- Monitoring and maintenance of the BC/ DR plans
- Continuous review of technology environments to enable effectiveness of the DR solution
- BCM process integration with ITSM processes
- Conduct periodical audits.

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HCLTech's Disaster Recovery (DR) solution is the next generation cloud based disaster recovery solution - HCL RecoverNXT.

RecoverNXT complements the HCLTech Business Continuity and Disaster Recovery method explained above and helps customers to reduce operational risks, significantly decrease unplanned downtime and maintain continuous operation of critical business processes. Based on the understandings from the BCP process plan, we help design, build, and manage solutions that help IT teams achieve a resilient, compliant, high-performance IT operation.

HCLTech leverages its partner ecosystem having capabilities of DR, like Azure Site Recovery, Zerto, DoubleTake, etc. However, holding the proposition of Microsoft Azure as a preferred public cloud vendor, ASR would be preferred Disaster Recovery Tool.

The key Highlights of RecoverNXT:

- True block-level Continuous Data Protection (CDP)
- Application snapshot Application Programming Interface (API) integration
- Heterogeneous asynchronous replication for physical and virtual instances
- Application integration and failover/ failback
- WAN optimisation
- P2V (physical-to-virtual) and V2V (virtual-to-virtual) recovery engine that supports all applications
- Automation of recovery for virtual machines and associated storage
- A fully-fledged recovery readiness and DR health portal.

How RecoverNXT works?

RECOVERNXT is an advanced disaster recovery solution that ensures the protection and availability of your critical data. Let's break down its key features:

- Guest Operating System-Based Replication:
  - RECOVERNXT operates within the guest operating system of the server you want to protect.
  - This flexibility allows you to deploy any storage in production, while the secondary site can use dedicated storage or cloud storage.
- Granular Disaster Recovery Capabilities:
  - RECOVERNXT leverages Continuous Data Protection (CDP) technology.
  - It provides granular DR capabilities to meet stringent backup and recovery requirements.
- Replication Process:
  - The replication process involves creating a baseline copy of the primary server's drive at the secondary server (known as Resyncing - Step I).
  - During this step, data changes are sent to the secondary server (Resyncing - Step II).
  - Subsequently, RECOVERNXT captures and sends only the changes in the primary server drive (known as Differential Sync).
- Failover and Failback:
  - In case of maintenance or primary server failure, RECOVERNXT switches to the secondary server through failover.
  - A failover operation is always followed by a failback operation, restoring the primary server from the secondary server.
- Data Restoration to Any Point in Time:
  - RECOVERNXT uses CDP technology, allowing data restoration to any specific point in time.
  - Consistent tags or bookmarks issued at the primary server ensure data consistency during the process.

The diagram below is a pictorial representation of the working of RecoverNXT.

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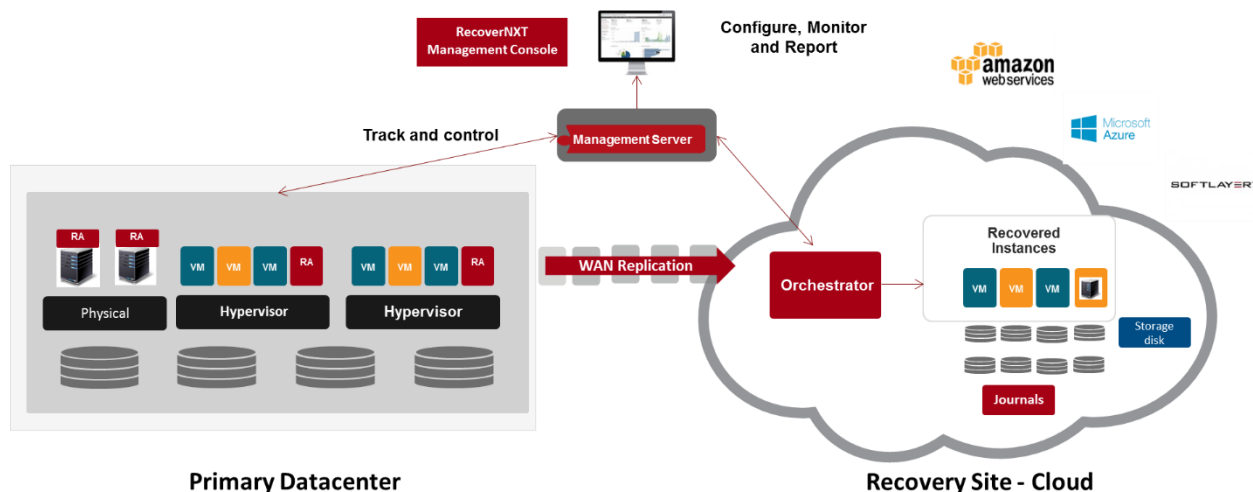
HCLTech's Disaster Recovery (DR) solution - HCL RecoverNXT

Data Backup/ Restore

1. Rising Data Growth:
   - The exponential growth of data necessitates robust backup solutions.
   - BackupNXT caters to this demand by providing scalable and efficient backup protection.
2. Smaller Backup Windows:
   - Businesses require faster backup processes to minimise disruption.
   - BackupNXT ensures efficient data capture and reduced backup windows.
3. Smaller Storage Footprints:
   - Traditional tape-based backups often consume significant storage space.
   - BackupNXT leverages modern data reduction techniques, optimising storage utilisation.
4. Faster Recovery and Accessibility:
   - Recovery speed is critical during disruptions.
   - BackupNXT's cloud-driven approach enables rapid data retrieval and self-control.
5. Challenges with Tape-Based Backups:
   - Tape technology has limitations, including slow read/write speeds and manual efforts.
   - BackupNXT eliminates these drawbacks by offering a more efficient and automated solution.
6. Next-Generation Backup-to-Cloud Service:
   - BackupNXT is designed for both structured and non-structured data.
   - It spans heterogeneous platforms and storage environments, including data centres, remote sites, and the cloud.
7. Secure and Optimised Backup Protection:
   - BackupNXT ensures data security during transmission and storage.
   - Modern data reduction features enhance efficiency, while scalability accommodates growing needs.

The key features which are offered as a part of this service under storage, network, design, security and management are in the table below:

Storage	Network	Design	Security	Management
Deduplication/ Compression	Source-side deduplication	Infinite scalability	Encrypted data-in-flight	Policy-based management
Incremental Forever	WAN optimisation	High Availability	Encrypted data-at-rest	Workflow automation
Synthetic full	Granular restores	Universal accessibility	Data redundancy	Centralised management

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How BackupNXT works:

HCLTech BackupNXT is a single solution which encapsulates all the complexities of designing, configuring and managing your backup environment and is offered directly as a service to customers. Owing to the deep techno-commercial analysis of various backup solutions in the market, it proposes the best end-to-end design to the customer after assessing his backup environment. Every solution is pre-tested in the HCLTech Centre-of-Excellence (CoE) labs before being incorporated in the BackupNXT partner ecosystem.

Described below are the major components of the BackupNXT suite:

BackupNXT Management Console (BMC)

It is a smart dashboard which gives a unified management view of your entire backup ecosystem. Its user-friendly interface gives full control of discovering, configuring, scheduling, running, monitoring and managing the complete backup environment. It takes metadata from the master server to allow production of job status reports or simply restoring a single file or folder from backup copies.

Master Server (MS)

This server resides either in the production site or in the Cloud, depending where the primary environment is hosted. It is the brain of the entire design. It keeps important records like the clients, backup targets, backup policies, scheduling information, index for backup files, etc. It also triggers the media servers to execute the user request for backup and restore activities. Every data zone should have one master server.

Media Agent (MA)

Media Agent primarily plays the role of a data mover. It takes the instructions from the master server and moves the data from source to the intended backup storage tier, as defined in the policy. Depending upon the solution, it may also do data compression, encryption and deduplication especially when the storage is not coming from a purpose-based backup appliance.

Active Tier

As per the basic design of BackupNXT, a small set of backup copies must be kept locally to support faster and operational recoveries. The Active Tier may be a purpose-based backup appliance or a standard SAN/ NAS storage appliance or cloud object storage depending upon the customer environment.

Cold Tier

This refers to the storage for offsite backup copies. It may be provisioned using public or private object storage. From public cloud, the infrequent access object storage tiers are preferred as the data once stored, would be rarely accessed or restored. The BackupNXT service can be used and deployed to protect workloads hosted either on-premises or cloud, as shown in the two figures below.
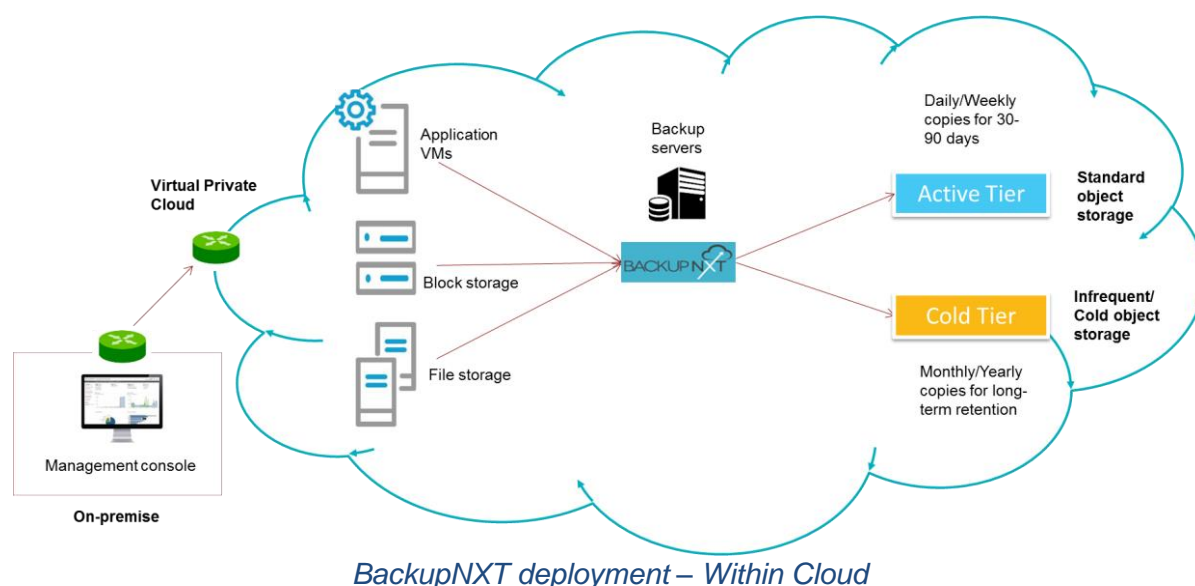
BackupNXT deployment – Within Cloud

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Integrated data protection

Unlike traditional backup solutions, BackupNXT creates a single index for all the data spread across the enterprise saved on physical servers, virtual machines, NAS, cloud, etc. Notably, it eliminates the traditional silos by providing a unified management whether the data is being backed up to cloud, tapes or disks, etc.

Workflows based automation

The Workflow feature provides a very powerful yet simple way to automate the complex and repetitive data management tasks. It enables administrators to quickly create custom workflows that bring together sets of individual tasks in a specific order or decision tree via an intuitive Graphical User Interface (GUI). It allows cutting down 30-50% of over-spending on backup administration.

Copy data management

Application and data move through various life-cycle phases – from development and test, to production and finally to retirement. BackupNXT orchestrates the complete lifecycle management by seamlessly replicating the copy of production to other environments. It also allows single-file recovery of files and databases for faster pointed restoration.

Reporting and analytics

It provides a very smart interface for automated configuration, monitoring, management and reporting of backup health and status. Enterprises can leverage their data in support of regulatory and compliance and other business needs. All the backups are saved with their metadata, so that the data can be easily recovered, accessed and leveraged when needed.

Deduplication and Synthetic full

All the backup copies are de-duplicated at the source across the sites and servers. By reducing the unwanted redundancy added during each subsequent full copy, the requirement for target storage goes down by 70-90%. We also save a lot on the time required to complete backups by copying only incremental changes from the source and creating a full copy using deduplication database later.

Security

Let's explore the key security considerations and design principles:

1. Security in Architecture Design:
    - We factor security into the architecture design by implementing measures such as:
        - Network Segmentation: Isolate critical components to prevent lateral movement.
        - Firewalls: Implement perimeter and internal firewalls for controlled traffic.
        - Data Encryption: Ensure data is encrypted both in transit and at rest.
        - Identity Access Control: Manage user access through robust identity and access management.
2. Third-Party Security Controls:
    - For workloads hosted in Azure Cloud, we include necessary third-party security controls.
    - These complement the native security features provided by Azure, such as perimeter NG firewalls, key security, vulnerability assessment, and anti-malware.
3. Design Principles for Secure Solutions:
    - Secured Infrastructure Setup:
        - Whether it's IaaS, PaaS, or SaaS, we establish a secure foundation for hosting customer solutions.
    - Secured Connectivity:
        - We ensure secure communication between on-premises and cloud environments.
    - Identity and Role-Aware Access:
        - Controlled access to the cloud platform based on roles and identities.
    - Periodic Security Testing:
        - Regular assessments to identify and remediate security vulnerabilities.
    - Data-at-Rest Security:
        - Encryption and access controls to protect data stored in the cloud.

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   o Proactive Event Monitoring:
      ▪ Continuous monitoring of workloads in IaaS, PaaS, and SaaS environments for security incidents.

Network Security – The Cloud setup will be protected by perimeter Firewalls, NIPS and VPN Solutions. The following network security provisions will be put in place:

- Web gateways to monitor and inspect traffic for any malware or malicious attacks
- Create and maintain security groups to restrict network access
- Restrict subnets and apply proper Network ACLs
- Configure iptables to provide extra security to virtual instance
- Deploy host based IPS
- Automatically detect and remediate policy violations
- Ensure all feeds flow into Security Information and Event Management (SIEM).

Network Security Group (NSG) is the main tool utilised to enforce and control network traffic rules at the networking level. Customers can control access by permitting or denying communication between the workloads within a virtual network, from systems on Azure via cross-premises connectivity, or direct Internet communication.

HCLTech will leverage the DDoS mitigation and protection of Azure. Always-on traffic monitoring, and real-time mitigation of common network-level attacks, provide the same defences utilised by Microsoft's online services. The entire scale of Azure's global network can be used to distribute and mitigate attack traffic across regions. Any additional third-party solutions and services can be procured as deemed necessary.

Security Log management - HCLTech will ensure that the required logs get collected from various sources in the Cloud and are sent over to the central event correlation engine deployed by the MSSP provider. Azure provides some tools, including Azure Monitor and Azure Log Integration, which enables users to integrate logs from assets deployed in Azure to third party SIEM tools.

Azure Security Centre (ASC) provides basic security monitoring and policy management across the Azure subscriptions. ASC collects data from VMs in order to assess their security state, provide security recommendations and alert to threats. However, these Azure-only tools lack some essential security capabilities.

To overcome these limitations, HCLTech can send the required logs to the MSSP's deployed log collection agents on Azure for security log management, which can then send the required events to the on premise SIEM for the required security correlation and threat detection and mitigation.

Endpoint Security – HCLTech will deploy the required Endpoint Security Solution for the customer's Cloud environment, which not only ensures Virtual Machines (VMs) are protected the moment they are provisioned, it also recommends and applies only the policies that are relevant. These fit dynamic environments, by following VMs as they are brought up and down. Some core capabilities that solution should have include:

- Anti-malware with web reputation to protect against constant malware attacks
- Network security, including intrusion detection and protection (IDS/ IPS) to shield unpatched vulnerabilities, as well as a stateful firewall to provide a customisable perimeter around each server.
- System security, including file and system integrity monitoring for compliance, as well as log inspection to identify and report important security events. Identify suspicious changes on servers, including registry settings, system folders and application files that should not change.

HCLTech's approach to security is shown in the diagram below.

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HCLTech's approach to security

Endpoint security will be managed through a single dashboard that allows continuous monitoring of multiple controls across physical, virtual and cloud environments. Robust reporting and alerting will help focus on what is important, so to quickly identify issues and respond accordingly. Integration with other systems, such as SIEM, will help incorporate security management as part of other data centre operations.

4. Vulnerability Assessment - Vulnerability Assessment (VA) is a critical component of cloud security infrastructure because it enables proactive detection and remediation of security vulnerabilities. HCLTech uses a tested and proven method for vulnerability assessment using both tool based and knowledge based assessment of vulnerabilities. HCLTech shall conduct VA on Azure workloads in the customer's environment in a periodic manner. Post each VA a detailed report would be shared to designated authorities.

HCLTech's approach to vulnerability Assessment is shown in the diagram below.
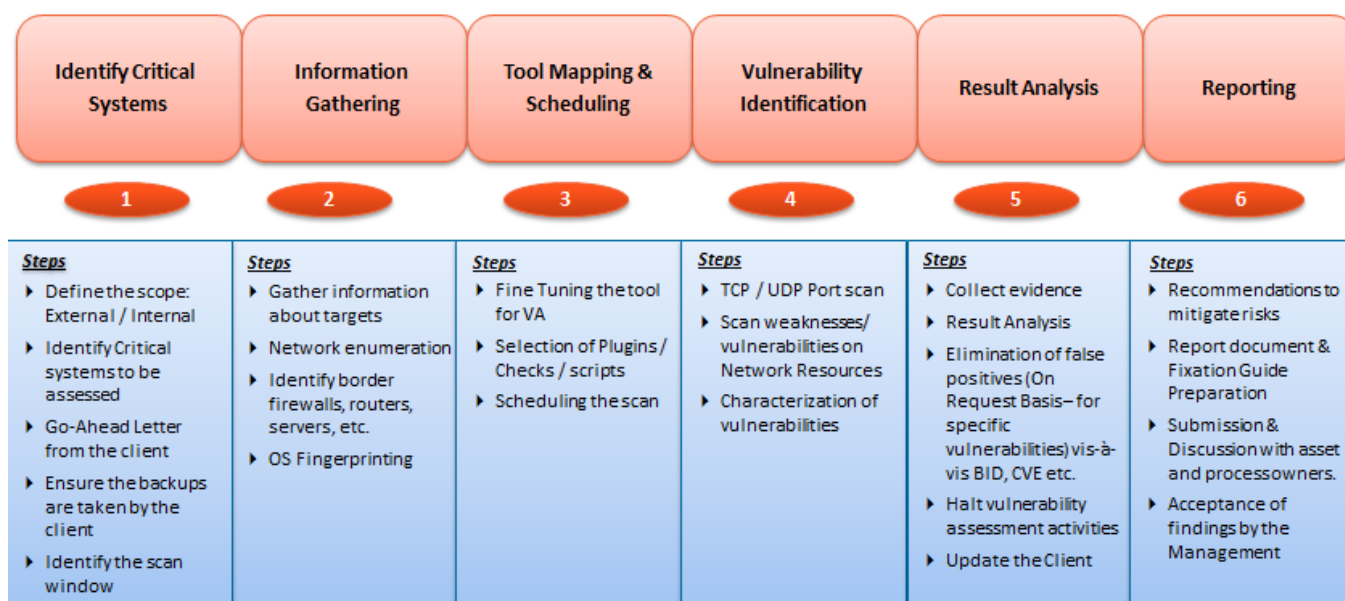
HCLTech's approach to Vulnerability Assessment

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G-Cloud 14 - Lot 3 Support – Cloud Consulting and Migration - Service Description

The vulnerability scanning to be followed consists of different phases, which are explained below:

- Discovery: As per the identified vulnerability scanning cycle, the HCLTech team will ensure that discovery scans are initiated. The discovery scan will help in discovering all the assets on the network and identify the assets that are newly added.
- Classification: Based on the outcome of the discovery phase, HCLTech and the customer's IT security team will classify the newly added assets into predefined groups. All the asset groups will be updated and any rogue asset will be removed.
- Scanning: Scanning will be undertaken by the team to identify the vulnerabilities and compliance violations in the identified scope.
- Distribution: Based on the output of the scanning phase, reports highlighting the vulnerabilities and compliance violations will be presented to the intended audiences in the agreed format. Also, remediation tickets that are prioritised on the basis of severity of impact are distributed to the relevant asset owners.
- Remediation: The prioritised remediation tickets are fed to the patch management team, which will ensure that the patches are implemented and configuration fixes are undertaken.

Encryption/ Key Protection - HCLTech will use best practice cryptography for the data in transit scenario, i.e. TLS v3. IPsec is another transit encryption protocol which can be used for creating Virtual Private network (VPN) tunnels from the customer's Cloud to on premise solution, which can utilise cryptography algorithms, such as 3DES and AES.

Azure Storage automatically encrypts customer data, before persisting it to Azure Storage, and decrypts the data before retrieval. The handling of encryption, encryption at rest, decryption and key management in Storage Service Encryption is transparent to users. All data written to Azure Storage is encrypted through 256-bit AES encryption, one of the strongest block ciphers available.

The proposed Azure Key Vault helps safeguard cryptographic keys and secrets used by cloud applications and services. By using Key Vault, we can encrypt keys and secrets - such as authentication keys, storage account keys, data encryption keys, .PFX files, and passwords - using keys protected by Hardware Security Modules (HSMs). Key vault streamlines the key management process and enables customers to maintain control of keys that access and encrypt the customer's data in the Cloud.

Identity and Access Management (IAM) - To avoid building separate identity silos solely for cloud-based services (the result of unique accounts within each of those providers and applications), HCLTech can empower the customer to evaluate extending the IAM service that can manage all users' access and authentication before they go to any applications - on premise or in the cloud. For employees, authentication is against a corporate directory. For partners, it could entail using identity federation via standards such as Security Assertion Markup Language (SAML) that enable the users of an organisation to easily and securely access the data and applications of other organisations, as well as cloud services via cloud single sign-on, thus preventing the need to maintain another list of user accounts.

For customer users who may already have an existing digital social identity (such as Facebook or Google) and would like to be able to leverage that identity, standards such as OpenID and OAuth (present in existing IAM services from third party) would allow those users to access web-based resources using those credentials and not require additional user registration steps.

Application Security - HCLTech will utilise the Azure Web Application Firewall services which provide robust security against targeted and automated attacks. OWASP Top 10 attacks like SQL Injections and Cross-Site Scripting (XSS). It will block an ever-expanding list of sophisticated web-based intrusions and attacks that may target the customer's applications hosted on web servers. It will scan all inbound web traffic to block attacks and scans all outbound traffic. Some of the important features include:

- SQL injection protection
- Cross site scripting protection
- Common web attacks protection such as command injection, HTTP request smuggling, HTTP response splitting, and remote file inclusion attack
- Protection against HTTP protocol violations
- Protection against HTTP protocol anomalies, such as missing host user-agent and accept headers
- Prevention against bots, crawlers and scanners.

Exclusions

For IaaS and PaaS, we provide the entire range of services across the various technologies. However, if there are any exclusions to the services, we provide then it will be called out on case to case basis

Account Management

- A dedicated Account Manager and Service Delivery Manager will be appointed to discuss and manage issues, changes and enhancements to the service.
- The location and extent of their involvement will depend upon the level of the engagement.

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