



**BHADALE GROUP OF COMPANIES**  
**- IT AND REAL ESTATE**



**Jul 13 2022**

**Quantum Enterprise Modernization Services Catalogue**

Bhadale IT Pvt. Ltd. (<https://www.bhadaleit.com/>)

**Bhadale Group of Companies**

Bhadale Group of Companies consists of:

1. **Bhadale IT Pvt. Ltd** is an IT and Computer Engineering subsidiary company

This division provides consultation in areas of cutting edge technologies, research outsourcing, and software consultation related to data center and related engineering practices

2. **Bhadale Engineering Pvt. Ltd** is a multi-engineering subsidiary company

Various divisions under this group provide design, & development of various IT and Engineering programs.

Bhadale Group has aggressive programs in place to serve the niche market. Below is related to cloud ecosystems

**Bhadale Group IT Division, Quantum Services department**

Below are few of our service offerings:

1. Quantum enterprise adoption ecosystems planning
2. Business Use case based quantum enterprise design
3. Open and proprietary quantum and classical ecosystems & integration
4. Partner ecosystems based solutions
5. Quantum enterprise cloud ecosystems implementation
6. Industrial domain specific quantum enterprise services
7. Project specific services
8. Custom ecosystems services

Details of the above are put in the table below

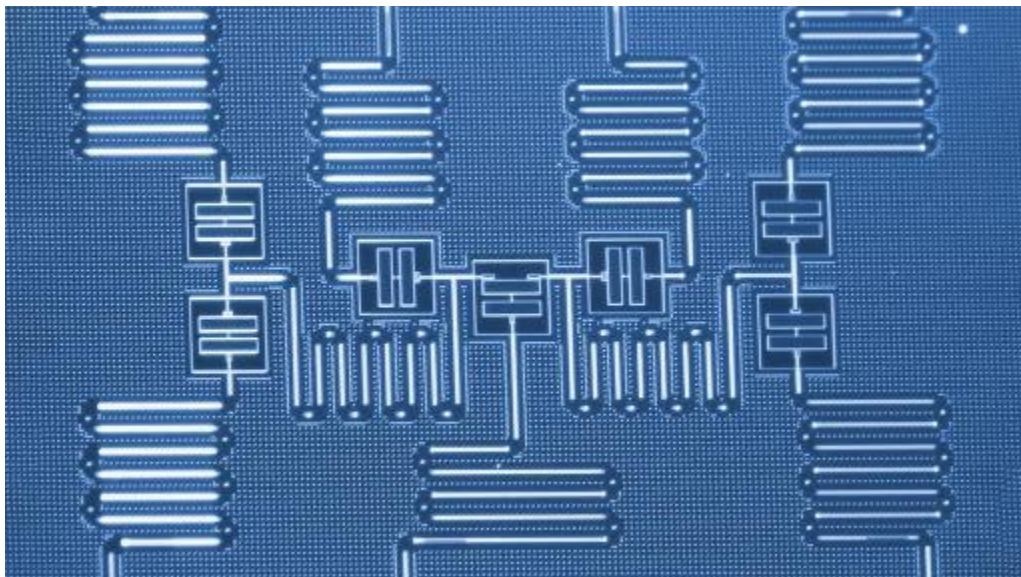


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We have a large set of subcategories; few are mentioned below with details tabulated

Service No	Service Name	Key Service features
1	Quantum enterprise adoption ecosystems planning & acceleration	<p>We offer a wide range of quantum ecosystems based enterprise modernization services for the convenience of our clients based on their business needs, and startup mission :</p> <ul style="list-style-type: none"> <li>• Classical enterprise IT assets / continuum, reuse based quantum ecosystem</li> <li>• Quantum Industrial taxonomy based ecosystems for various enterprise workloads like big data, analytics, real-time, financials, risk management, robotics, optimizations, supply chain optimizations etc</li> <li>• Ecosystems leveraging modernization techniques, frameworks and servers like XACC, heterogeneous CPU-QPU-GPU processors and accelerators</li> <li>• Ecosystems from IBM/Red Hat, Google, AWS, Intel and partners for various quantum paradigms like analog, digital , gate based and adiabatic systems</li> <li>• Popular market platforms like GCP, Azure, Apache and Open Shift</li> </ul> <p>Few of the generic enterprise ecosystems and dusters are[1]:</p> <p>Component suppliers</p> <ul style="list-style-type: none"> <li>• Silicon based quantum chips , quantum memory, cryo-electronics</li> <li>• Electrical components for classical and quantum system power interfaces, cryogenic systems, nano-electronic assemblies, etc</li> <li>• Dilution refrigerators related enterprise integration with engineering systems, interfaces and backups</li> <li>• Optics and lasers related opto-photonics, laser, lidar and related setup for experiments in lab and production environments</li> </ul>

		<p>Hardware providers</p> <ul style="list-style-type: none"> <li>Quantum processing units from Intel, Google, D-Wave, IBM</li> <li>Quantum memory from partners for quantum state</li> <li>Integrated quantum-computing systems related middleware, bridges, data plane, control plane systems management harness</li> </ul> <p>Software providers</p> <ul style="list-style-type: none"> <li>Operating systems like Linux, Kernels, Host process managers, virtualization , paging etc</li> <li>Compilers, transpilers, translators, etc</li> <li>APIs</li> <li>Applications</li> </ul> <p>Based on our vast experience and expertise in serving the engineering and IT industry, we offer accelerated speedup in adapting to the ecosystem and use IEEE, NIST, ISO standards. We leverage on our tie-ups and partnerships with various institutes, universities and network</p>
2	Business Use case based quantum enterprise design	<p>Client business specific system design, with a general focus on domain and special focus on client quantum enterprise needs. Few of our services:</p> <ul style="list-style-type: none"> <li>Requirements analysis to draft the quantum landscape with various types of elements, subsystems across various enterprise divisions</li> <li>Quantum business models design based on use cases and generic technology –agnostic platform design</li> <li>Technology based quantum platform specific models for target quantum servers, computing backend simulators and other ecosystems</li> <li>A business ecosystem modeling based on industry frameworks and release cycles ( example IBM Crypto Safe, release horizons) and existing business and domain priorities</li> <li>Enterprise platform design based on the needs of the interrelated divisions, System of Systems (SoS) and Cyber Physical Systems</li> <li>Business use case modeling using Model Based Systems Engineering (MBSE), and SySML</li> <li>Design of quantum inventory for various quantum computer assets, equipments, that help in the scoping and development of the architecture, engineering design, inventory, purchase decisions, program and project planning</li> </ul>
3	Open and proprietary quantum and classical hybrid ecosystems planning & integration	<p>We offer planning for open source enterprise tools, products, frameworks, and integration services for existing and new ecosystems. Few of our services are:</p> <ul style="list-style-type: none"> <li><i>Quantum Internet alliance</i> based integration for end nodes (trapped ion qubits, diamond NV qubits, neutral atom qubits) and quantum repeaters (rare-earth-based memories, atomic gases, quantum dots) and integration of both subsystems [2]</li> <li>Open Stack, Open Nebula, Apache stacks, Linux, Java based ecosystems</li> <li>Open Networking, Open Virtualization , Open Orchestrator etc</li> <li>Tool chain design using open frameworks like Eclipse, Linux, OpenQASM,</li> </ul>

		<p>KQCCircuits, Tensorflow Quantum, XML , etc</p> <ul style="list-style-type: none"> <li>• Cross- platform modernization to meet performance, functional and non-functional requirements</li> <li>• Offer technical design, architecture, testing and release management</li> </ul>
4	Partner Ecosystems based quantum solutions	<p>We offer partner ecosystems based enterprise solutions. Few are mentioned below:</p> <ul style="list-style-type: none"> <li>• Google</li> <li>• IBM</li> <li>• Intel</li> <li>• Red Hat</li> </ul> <p>Solution design using enterprise servers that offer functions based on libraries and algorithms like Google Cirq, Tensorflow quantum, Colab, Google Quantum, Google algorithms and Google industrial solutions based offerings for various domains.</p> <p>Solution packs from IBM that leverage their enterprise stack like IBM Qiskit, IBM Quantum labs, IBM Circuit Composer, IBM Power10 series, IBM Z16 Mainframe server, Red Hat Open Shift, IBM Crypto-Safe post quantum cryptography based designs</p> <p>Enterprise Bundles with software libraries, hardware like Intel quantum computing chips , control circuits, interconnects, hardware for various qubits like superconducting qubits, quantum dots, silicon chips (CMOS, MOSFET , FPGA) , Cryoelectronics, Horse Ridge II [3] cryogenic quantum control chip</p> <p>We offer extended services for full stack integration, cross-compilers, cross-programming, transformations from classical to quantum states, quantum memory based operations, cryogenic based thermal tests, heat dissipation checks at sub zero temperatures</p>
5	Quantum enterprise cloud planning and implementation	<p>We offer value-added enterprise services from various partner offerings. Few of our services:</p> <ul style="list-style-type: none"> <li>• Cross-enterprise ecosystems design, program development</li> <li>• Offering our unique expertise in quantum data center engineering</li> <li>• Enterprise scale migration of classical data, tiers to multi-division ecosystem</li> <li>• Offering a centralized or decentralized enterprise governance systems</li> <li>• Cross cloud security systems using industry COTS from Google, and IBM</li> <li>• Enterprise level micro services framework design for various cross-team, cross-divisional functions</li> <li>• Multi cloud managed enterprise services framework design</li> <li>• Custom enterprise ecosystem design based on needs</li> <li>• Planning for various shared services, resource pooling and management of inventory from a central console</li> </ul>
6	Industrial domain specific quantum enterprise services	<p>We offer unique tailored enterprise ecosystems for 50+ domains based on the leading partner solutions.</p>

		<p>One sample domain offerings :</p> <ul style="list-style-type: none"> <li>• Quantum military systems for improvised missile systems, ambient sensors, precise clocking and real time quantum computing (able to solve years of supercomputer's effort)</li> <li>• Quantum military systems for improvised anti-missile systems using a sleuth photon fabric with detectors able to detect many airborne, water based and land missile dispatches from various earth's/ sea layers</li> <li>• Quantum foreign object ecosystem shield for better protection and safeguard of protected and other assets offering 100+ more safety points than classical protection</li> <li>• Quantum biosphere and ecology protection system for safety of the earth resources from hostile attacks like missiles, air, water or land based bio-chemical warfare deliveries includes real time signature matching of various viruses, flies, birds, or vector based attacks</li> <li>• Quantum aided military supplies for various types of operational and capability needs to handle, counter or defeat the enemy cause</li> </ul>
7	Project specific services	<p>We offer services based on popular projects like migration, quantum project frameworks, quantum technology stacks. We cater to specific needs like work load specific to Big data, Data science, AI/ML, Micro services, real time streaming, mobile etc.</p> <p>Few of our services are:</p> <ul style="list-style-type: none"> <li>• Quantum Project Requirements analysis</li> <li>• Identifying project specific quantum ecosystems</li> <li>• Designing the development tools, apps, services</li> <li>• Integrating and testing into the program environments</li> <li>• Offer value added services</li> </ul>
8	Custom ecosystems services	<p>As per client needs based on our offers, mixture of these along with client specified systems</p> <p>We are flexible to offer our consultants on a project or a time basis, as an internal or external hire based on your business needs. We place our consultant based on your specified merit and work needs. We have a team of licensed engineers and developers who can be of help in your project and quantum solutions</p>

#### References:

- 1: <https://www.mckinsey.com/~media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/quantum%20computing%20use%20cases%20are%20getting%20real%20what%20you%20need%20to%20know/quantum-computing-an-emerging-ecosystem.pdf>
- 2: <https://quantum-internet.team/>
- 3: <https://www.intel.com/content/www/us/en/newsroom/news/2nd-gen-horse-ridge-cryogenic-quantum-control-chip.html>

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