Call for Proposals
(Cohort-2)

14th September 2022

Ministry of Electronics & Information Technology (MeitY) Quantum Computing Applications Lab (QCAL) In association with Office of Principal Scientific Advisor

Contact e-mail ID

meity.qclab@digitaindia.gov.in

Website

https://quantumcomputing.negd.in/

https://www.meity.gov.in/

1 Background

The Ministry of Electronics and Information Technology (MeitY), in collaboration with AWS, has established MEITY Quantum Computing Applications Lab (QCAL). QCAL will help accelerate quantum computing-led research and development and enable new scientific discoveries in the area of quantum technologies.

This lab will offer AWS Braket quantum computing as a service to the researchers, scientists, and developers, in areas such as manufacturing, healthcare, agriculture, and aerospace engineering etc. along with technical and programmatic support from Amazon Internet Services, Pvt Ltd (AISPL) for the Lab. Amazon Braket is a fully managed quantum computing service that helps researchers and developers get started with the technology and accelerate research and discovery. AISPL will help in skilling the project investigators, students, post docs who will be working in these projects. Workshops, immersion days will be organized to help embark researchers on AWS cloud , Amazon Braket.

The objective of the MEITY Quantum Computing Application Lab is to

- Accelerate India's progress in quantum computing R&D including skilling.
- Demonstrate social impact through cloud quantum computing technology by supporting experiments and development of prototype solutions across sectors such as financial services, chemical engineering, material sciences, agriculture and healthcare domains and others.

2 Past updates- Cohort-1 i.e. Call for Proposal in 2021

Aligned to the objectives above, proposals are invited in the year 2021, call for proposals was open during September- October wherein proposals were received from the researchers from 19 leading institutions for wide areas of research in Quantum Applications (Optimizations in industry domains: Energy, Transportation, Finance; Quantum algorithms: Error Correction, Simulation, Protocol development, Machine Learning). Post evaluations, Meity QCAL awarded credits to the 16 proposals.

3 Cohort-2 i.e. Current Call for Proposals 2022

Aligned to the objectives above, second cohort of call for proposals are invited from researchers in the suggested areas as indicated below:

- Fundamental aspects of quantum computation and quantum information.

- Exploration and building of quantum algorithms which test cases established with quantum simulators and run them in quantum hardware
- Quantum machine learning
- Optimization problems across many industries including telecommunications, supply chain logistics, and financial services.
- Simulation of quantum systems with case-studies in broad applications e.g., design of new materials and catalysts, drug discovery, and the exploration of high-temperature superconductors.

The proposals should clearly call out the computation requirements and support sought. Each proposal will be evaluated by a committee, and credits will be offered subject to the recommendations of the committee.

4 Who can apply (Eligibility)

Academicians, Scientists, Technologists and other practicing researchers from recognized academic, research institutions, registered start-ups, and registered scientific societies. Collaboration between start-ups and academia is encouraged.

NOTE: A separate initiative is being worked out to allocate credits under this project for student's learning purposes. Hence, student learning asks will be covered in separate call for proposal and will not be eligible under this call for proposal.

5 Evaluation of Proposals

Each proposal will be evaluated by an Evaluation Committee. Key factors to be considered for evaluation are:

- Novelty of the proposal
- Viability of proposed project
- Industry Relevance
- Individual vs team contribution
- Clearly identifiable timelines, milestones and deliverables

It may kindly be noted that in addition to the review of proposals received, the principal investigators and concerned team may be asked to present their proposal. If so, the proposal presentation may take place preferably online. No cost will be reimbursed in connection with the proposal preparation and presentations etc.

Keeping in view the volume of proposal MeitY QCAL Team will only respond to the proposals shortlisted for further considerations.

6 Support Offered

- The MeitY Quantum Computing Application Lab will provide credits to the approved proposal/projects to access to quantum computing hardware, simulators, programming tools (via Amazon Braket) and other AWS services at no cost. The credits granted for computing will allow researchers to explore and build quantum algorithms, test on quantum circuit simulators, and run them on different quantum hardware technologies. The credit will be provided as per the scope of the project/proposal and the recommendations from the committee.
- Currently Amazon Braket provides access to four major quantum computing hardware - 1. Rigetti - Gate-based superconducting qubits 2. IONQ - Gate-based ion traps 3. OQC : Lucy – Gate-based Lucy and 4. DWave - Quantum annealing. For more details visit: https://aws.amazon.com/braket/
- This call for proposal is limited to award free of cost access to quantum computing facility, for a certain period of time, basis estimates shared and the final decision of the committee at MeitY.

7 AWS Cloud credit

As part of the Quantum Computing application Lab, AWS is offering researcher technical support and credits for the use of Amazon Braket service to advance research on Quantum computing. After the evaluation of the proposal by technical review committee the researcher of the selected projects will awarded with AWS credit to instantly access virtually the AWS infrastructure along with Amazon Braket. The credit will be provided as per the scope of the project.

8 Tenure of the Project

1+1 years

9 Guidelines:

1. The Project proposals should have clear objectives, scope, outcome and quantifiable deliverables with specific milestones and time frame.
2. The proposals may be single or multi-institutional with well-defined role of individual institutions.
3. Collaboration between start-ups and academia is encouraged.
4. The proposals should clearly bring out AWS service requirements. Project should be implemented on AWS cloud and leverage AWS Braket for all quantum computing needs.
5. Important criterion for selection of a proposal, for further review, would be the promise, potential and evidence of new technology development

leading to prototypes, proof of concepts in the above focus areas and its delivery.

6. Full CV of the PI (Principal Investigator)/Co-PI including research publication, citation, H-index, experience in the relevant area must be included in the proposal so that due weightage would be given.
7. Each proposal proposed by PI & Co-PI should mention about the stage of maturity of their relevant labs, at this point in time, so that the expectations of the time required in obtaining results from that lab can be clearly understood.
8. For more information, details and info on this programme, visit http://quantumcomputing.negd.in/ and for any queries, Contact e-mail ID at **meity.qclab@digitaindia.gov.in**
9. Project proposal in the **Standard Application Format** only (**Refer Annexure**) will be accepted which shall be submitted to **meity.qclab@digitaindia.gov.in** by PI only as per timeline. The proposal should be duly forwarded with the **Cover Letter** (**refer Format at Annexure B**) endorsed by the Head of the Institution.

10 Submission Timeline

Sr.	Activities	Timeline
i	Announcement	T^0 = 14th Sep 2022
ii	Submission of queries (if any)	T^0 + 15 days = 21st September 2022
iii	Last date for submission	T^0 + 30 days = **30th Nov 2022**
iv	Evaluation of proposals	Based on evaluation
v	Final selection	Based on evaluation

Annexure A- Standard Application Format for Proposal Submission

1. **General Information**

   Project title:

   Priority area and sub-area:

   Duration (in months):

2. **Principal Investigator(s) and Co-PI's:**

SPOC (With whom the communication will be made- if any)	Designation: Department & Institution name: Address : Email: Phone numbers:
Principal Investigator	Designation: Department & Institution name: Address : Email: Phone numbers:
Co-PI's	Designation: Department & Institution name: Address : Email: Phone numbers:
Any other team member (if any)	Designation: Department & Institution name: Address : Email: Phone numbers:

3. **Details of Collaborating Institutions, if any:**
4. **PI's and Co-PI's prior experience in Quantum Computing:**
5. **PI's and Co-PI's past or current projects/research in Quantum Computing (details of funding agency, title of the project/s, 200 words summary of the project/s:**
6. **Project summary (Not more than two page):**
7. **Objectives**
   - Problems intended to be addressed by proposed project

- International Review status: how your proposal finds the gap

8. Work Plan (Max 1000 words)

- Approach with detailed methodology
- Relevance to your current work
- PoC, Proto-typing possibilities - what and how
- Prospective Risks and mitigation measures

9. Estimated Quantum Compute requirement

Amazon Braket provides access to quantum computers, managed simulators that simulate quantum circuits, and managed notebook development environments. All these services are billed separately for use of each of these capabilities, as well as other AWS services that one uses with Amazon Braket such as Amazon S3 for storing the results of quantum computations.

https://aws.amazon.com/braket/features/

https://aws.amazon.com/braket/pricing/

https://aws.amazon.com/braket/faqs/

Here are the references for estimating the cost of resources required the proposed project. Please add the estimation as per to your deliverables and milestones in the following table.

10. Milestones - connected deliverables - timeline

Deliverables	Milestones	timeline (months)	AWS credit estimation
1	1.1		
	1.2		
	1.3		
2	2.1		
	2.2		

11. 2-page CV (as per the following format) for each PI / CO-PI /Team Members: Attach separately

Name	
Designation	
University/Institute/company	
Qualification:	

Sl. number	Degree	Subject	University/Institute

Profession Recognition/Award/Prize/Certificate, Fellowship received	
List of publications in Quantum Computing (top 5)	
List of publications, any (top 5)	
Patents (top5)	
Books/Reports/Chapters/General articles etc. (top5)	
Any other information	

Annexure B- Format for Cover Letter to be Enclosed with the Proposal

Endorsement from the Head of the Institution

(To be given on University/ Institute/Organization Letter Head)

This is to certify that:

1. Prof./Dr. _____, the Principal Investigator of the project titled .... is working in our University/ Institute/ Organization/ College will assume the full responsibility for implementing the project.
2. The Investigator is a regular employee of our University/ Institute/Organization and working as ..... in ..... department.
3. The date of project starts from the date on which the University/Institute/ Organization/College receives the letter of acceptance from MeitY, New Delhi.
4. The investigator will be governed by the rules and regulations of University/ Institute/Organization and will be under administrative control of the University/ Institute/Organization for the duration of the project.
5. The grant is in from of credit from Amazon Web Services (AWS) to use the quantum computing infrastructure of AWS cloud.
6. No administrative or other liability will be attached to MEITY, New Delhi at the end of the project.
7. The University/Institute/Organization will provide basic infrastructure and other required facilities to the investigator for undertaking the research project.
8. The University/ Institute/Organization will take into its books all intellectual properties created in the above project.
9. The University/ Institute/Organization assume to undertake the financial and other management responsibilities of the project.

Seal and Signature

Registrar of University/Head of the Institute/Head of organization

Name of the University/ Institute/Organization

Annexure C: Evaluation Process

(Tentative)

A three tier process:

1. Initial screening and peer review
2. A formal presentation before the Evaluation Committee (if required)
3. Short listing and recommendation for selection by the Evaluation Committee based on review at para 1 & 2 above.

1. **Peer review process**

- Initial screening - Based on the guide line outlined in the proposal call, the validity/authenticity of the PI and project will be checked.
- Major parameters: Affiliation of the Principal Investigator (PI) and Co-PI; whether proposes area of work falls under quantum computing domain; whether all the details according submitted are in accordance to call for proposal; endorsed by the institute director, PIs experience in the field
- Review: Screened proposals will be reviewed by the Evaluation Committee and if required a domain expert maybe invited for expert review. Suggested metrics for review:
    - Novelty of the work proposed;
    - Industry relevance
    - Collaboration element with Start-up/Industry
    - Achievable deliverables and connected milestones are projected in the proposal
    - PI will be invited for presentation basis the review report.

2. **Formal presentation process** (if required)

- PIs will present their proposals to the Evaluation Committee through a 30 minute interaction.
- Suggested contents: Motivation and goals of the project (5 min); Current status of the work (5 min); Proposed work (5 min);Deliverables - milestones - timeline - credit ask (5 min); Q&A (10 min)
- The Evaluation Committee will grade proposals based on following (but not limited) metrics:
- Novelty of the proposal
- Technical and social feasibility and potential superiority of the approach
- Current status and applicability - Near term; Long term
- Possibility of PoC/prototyping
- Possibility of translating into a solution for the Healthcare/Finance/Energy/Materials industries/Other
- PIs past experience in the field
- Expertise brought by the collaborating institute/industry/start-up

- Stakeholders' involvement including community rooting.

MeitY at the behest of Expert Panel may introduce any other criteria considered to be critical for successful implementation of the project.

3. **Final selection by MeitY**

Evaluation Committee will recommend the list of credible projects to MeitY. MeitY will finally decide the list of the proposals to be granted credits.

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