



PRESIDENCY OF
THE REPUBLIC OF TÜRKİYE
**SECRETARIAT OF
DEFENCE INDUSTRIES**



SSB **QUANTUM ALGORITHM** **CHALLENGE GUIDE**

 **aselsan**

 **BİLİŞİM VADİSİ**
Bilişim Vadisi Kurumu

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 **TÜBİTAK**

 **Türk Telekom**
Değerli Hissedar

 **TÜRKİYE
BANKASI**

 **YapıKredi**

ABBREVIATIONS

EU	European Union
NATO	North Atlantic Treaty Organization
OSCE	OSCE: Organization for Security and Co-operation in Europe
SSB	Presidency of the Republic of Türkiye, Secretariat of Defence Industries
T.C.	Republic of Türkiye
UN	United Nations

DEFINITIONS

Applicant	A participant who has submitted an application through the official challenge website and initiated the preliminary application process but has not yet successfully completed the pre-evaluation stage to become an official competitor.
Entanglement	The state where two or more quantum particles are connected by quantum correlation in such a way that measuring the state of one instantly determines the state of the other, regardless of the distance between them.
Force Majeure	Any extraordinary legal or factual circumstance beyond the control of the Organizing Committee that prevents the challenge schedule, operations, or physical/online participation, including natural disasters, pandemics, war, mobilization, infrastructure failures, communication outages, or similar events.
Jury Panel	A panel of experts responsible for evaluating the solutions, source code and structures and presentations developed by the competing teams while considering the business success criteria defined by the problem providers, and assigning the final scores.
Optimization Problem	A class of mathematical problems that seeks the optimal (minimum or maximum) value of an objective function—such as cost, risk, or energy consumption—under a given set of constraints.
Organizing Committee	The administrative and technical authority consisting of stakeholder institution representatives, academicians, and field experts who carry out the general planning and coordination of the challenge. It is responsible for announcing the challenge, conducting the application processes, determining the challenge stages, establishing and implementing the rules, and defining the challenge problems, datasets, evaluation criteria, and technical infrastructure.

Quantum Algorithm	A sequence of computational steps designed to run on quantum computers by utilizing quantum mechanics principles such as superposition, entanglement, and interference.
Quantum Programming	The process of designing, coding, simulating, and testing logical gate sequences and algorithms (via libraries such as Qiskit, Cirq, etc.) that can be executed on quantum computers, both theoretically and on real hardware.
Superposition	The feature of a quantum bit (qubit) to exist simultaneously in both $ 0\rangle$ and $ 1\rangle$ states (and specific linear combinations of these two states), unlike classical bits.
Team	A community gathered to participate in the challenge, formed in accordance with the number of people and qualifications specified in this guide. This community develops quantum algorithms and solutions in line with the problems to be solved, completes the requested tasks during the challenge processes, and manages technical and operational processes through a division of labor among its members.
Team Leader	The participant who represents the team before the Organizing Committee, who must be a citizen of the Republic of Türkiye. The Team Leader is primarily responsible for tracking all processes, ensuring the accuracy of official documents, coordinating communication during award processes, and submitting requested documents.

1. PURPOSE OF THE CHALLENGE

Quantum programming has become increasingly important as it offers an alternative approach for solving certain classes of problems that are computationally difficult for classical computers. Today, digital transformation, the exponential growth of data, and the widespread occurrence of complex optimization problems continue to push the limits of conventional computational methods. Quantum computers have the advantage of theoretically providing significant speed and more efficient solution approaches compared to classical methods in certain types of problems by using quantum mechanical principles such as superposition and entanglement. Therefore, quantum programming is considered not only a new software development approach but also a mindset shift that expands the foundation of computing science.

The potential application areas of quantum programming are quite broad. For instance, quantum algorithms are expected to provide benefits in areas such as complex optimization problems, logistics network planning, supply chain management, vehicle route planning, inventory management, airline and railway scheduling, production planning, financial portfolio optimization, risk analysis, balancing energy generation and distribution systems, smart grid management, and resource allocation in telecommunication networks.

Furthermore, quantum algorithms are expected to make significant contributions to molecular simulation, computational chemistry, and materials science by enabling direct modeling of atomic and subatomic systems. This capability has the potential to accelerate drug discovery, advanced materials development, next-generation semiconductor research, and large-scale machine learning and artificial intelligence applications through more efficient processing of massive datasets. Quantum algorithms, which are becoming increasingly widespread in the mentioned civilian areas, have the potential to solve many complex problems in the defense industry—which currently take a very long time to solve with existing computing capabilities—in a much shorter time and more effectively.

Within the scope of Quantum Technologies, under the leadership of Defence Industries (SSB); the SSB Quantum Algorithm Challenge is being organized in the field of quantum computing with the cooperation of our country's leading civilian institutions, defense industry organizations, universities, technoparks, and national/international quantum computer service provider organizations. The challenge aims to increase interest and awareness in quantum technologies, strengthen inter-institutional information sharing and cooperation, develop qualified human resources, and contribute to the sustainable growth of our country's quantum technologies ecosystem.

Within the scope of the challenge, participants are expected to develop solutions using quantum algorithms based on the needs of stakeholder organizations operating in the banking, finance, and telecommunications sectors, or based on sample problems derived from these needs. These solutions are also expected to contribute to problems in the Defense Industry that can be solved with Quantum Algorithms.

2. APPLICATION AND PARTICIPATION CONDITIONS

- The challenge is open to undergraduate, graduate, and doctoral students, graduates of these programs, and field experts working in defense industry and civilian sector institutions/organizations who are interested in quantum programming and aim to develop solutions to problems using quantum technology.
- All participants are required to create an individual profile through the official Challenge website (<http://kquantum.ssb.gov.tr/yarisma>) prior to application. Participants and the Team Leader are responsible for ensuring that all requested information and documents submitted during the profile creation process—including educational background, citizenship information, and other qualification documents—are accurate, up-to-date, and complete.
- Participation in the Challenge is team-based. Each team must consist of a minimum of three (3) and a maximum of six (6) members. The Organizing Committee reserves the right to modify the minimum and maximum team size requirements if deemed necessary.
- The application on behalf of the team shall be submitted by the Team Leader through the official Challenge website. The Team Leader is responsible for monitoring all processes during and after the application process, as well as managing all communication and coordination with the Organizing Committee.
- The Team Leader must be a citizen of the Republic of Türkiye (T.C.). In addition, the number of T.C. citizens within the team must be at least half of the total number of team members.

- ❑ Citizens of NATO member countries may apply and participate as team members. Countries that are only members of international organizations with which NATO has institutional relations (such as the EU, UN, OSCE, etc.) are not included in this scope. The Team Leader is responsible for submitting complete and accurate official documents regarding citizenship status, while the Organizing Committee is responsible for checking the validity and whether the documents are up to date.
- ❑ For the list of NATO member countries, please refer to <https://www.nato.int/en/about-us/organization/nato-member-countries>

3. CHALLENGE STAGES

The challenge consists of the stages given below.

Stage	Name	Format	Date
1	Introduction	In-person, SSB Nuri Demirağ Conference Hall	June 24, 2026
2	Application	Online application (https://kuantum.ssb.gov.tr/yarisma) (Creation of participant profiles and teams)	June 24, 2026- July 31, 2026
3	Preliminary Elimination Stage	Online exam / Online solution development / Team presentation, etc. (May consist of one or more stages based on the evaluation of the Organizing Committee.)	August 2026
4	Final Challenge (Hackathon)	2 day in-person (Teknopark Istanbul)	September 2026
5	Announcement of Challenge Results	Online (https://kuantum.ssb.gov.tr/yarisma)	October 2026
6	Award Ceremony	To be announced by the Secretariat of Defence Industries.	October 2026

- ❑ Individuals wishing to participate in the Challenge are required to individually enter their information completely and accurately through the official Challenge website and create their own Applicant profiles. At this stage, Applicants are not required to be part of a team. Individuals who do not create a profile or leave it incomplete will not be eligible to proceed to the next stage.
- ❑ Applicants who successfully complete their individual profiles will proceed to the second stage, where they will form their Teams in accordance with the rules specified in the guideline document. All information and documents submitted by Teams during the application and Challenge process must be verifiable.
- ❑ The Organizing Committee reserves the right to request additional documents and conduct verification at any time to confirm the accuracy of the submitted information and documents. Teams found to have provided false, incorrect, or misleading information, engaged in plagiarism, or violated the Challenge rules will be disqualified from the Challenge by decision of the Organizing Committee, regardless of the stage reached. It is the responsibility of the Team Leader to ensure that all Team Members fully meet the Challenge participation requirements and can properly document their eligibility. If any Team Member is found not to meet the required conditions, the relevant Team will be disqualified from the Challenge, regardless of its current stage.
- ❑ In the application form, Teams will be asked for their preferred problem categories to compete in. The Organizing Committee reserves the right to determine the final categories in which teams will compete and to arrange the distribution of Teams among the categories.
- ❑ If the Organizing Committee deems it necessary, preliminary evaluation and networking events may be organized. The Organizing Committee fully reserves the right to make any changes, add stages, or cancel stages in the challenge schedule and processes.

- As part of the preliminary elimination phase, a scoring and evaluation mechanism (online exam, online solution development, team presentation, etc.) determined by the Organizing Committee will be applied. All process-related information will be published on the official Challenge website.
- Details regarding the technical infrastructures, simulation tools, and cloud platforms to be used within the scope of the Challenge, and the procedures for training on the use of these systems, are determined by the Organizing Committee and announced via the official website of the Challenge. It is the responsibility of participants to follow all announcements.
- The access rights to be provided to the teams during the Challenge stages, the scope of technical support, the format of the solution files, and the submission conditions are subject to the rules determined by the Organizing Committee. Submissions made outside the designated methods and deadlines will be considered invalid.
- Participants are responsible for providing and properly operating all personal hardware and equipment, such as computers, during both in-person and online stages of the Challenge. The Organizing Committee cannot be held responsible for any disruptions arising from hardware failures and/or internet connectivity issues during online activities.
- Attendance of all team members is mandatory for in-person stages of the Challenge.
- Challenge evaluations are carried out by the Jury Panel formed by the Organizing Committee.
- The dates when the challenge results will be announced, the award amount, criteria, and the form of award presentation are at the discretion of the Organizing Committee. The Organizing Committee reserves the right to change the award amount, content, and award ceremony details in cases of force majeure or when it deems necessary.

4. PROBLEM CATEGORIES AND DEFINITIONS

- The problem areas to be addressed within the scope of the challenge are the Banking, Finance, and Telecommunications sectors. The Challenge is defined as the solution of optimization and modeling problems derived from these sectors.
- The Organizing Committee reserves the right to partially or completely change, update, or restructure the scope of the Challenge categories, problem definitions, dataset content, and scenarios related to problem areas in line with current needs.
- The final assignment and matching of teams to problems during the Final Challenge (hackathon) is entirely at the discretion of the Organizing Committee. Decisions will be made to ensure an equal distribution of teams across each problem area, taking into account the problem preferences indicated by teams during the application process.
- Teams will compete within their assigned problem categories, and rankings will be determined on a problem-specific basis.

5. RULES

The rules valid within the scope of the Challenge are included in this document and will also be published on the official Challenge website.

6. EVALUATION CRITERIA

The evaluation criteria valid in the elimination and Final Challenge (hackathon) will be announced on the official Challenge website.

7. IMPORTANT DATES

- Introduction: June 24, 2026
- Application Deadline: July 31, 2026
- Preliminary Elimination: August 2026
- Final Challenge (Hackathon): September 2026
- Announcement of Challenge Results: October 2026
- Award Ceremony: October 2026

8. AWARDS

Awards will be given separately for the rankings in each category. Award and special support details will be announced on the official Challenge website.

- First place team: 400,000 TL
- Second place team: 250,000 TL
- Third place team: 150,000 TL

In addition, special support mechanisms—such as company establishment support, rental support, investment support, and patent and academic consultancy services—may be provided by stakeholder organizations of the Organizing Committee to enable the transformation of ideas and projects into sustainable startups.

9. ORGANIZING COMMITTEE, SPONSORS, AND INFRASTRUCTURE PROVIDERS

The institutions and organizations involved in the Organizing Committee are listed below:



Award sponsor institutions are listed below:



Infrastructure provider institutions are listed below:



10. CONTACT AND SUPPORT INFORMATION

Communication channels are available on the official Challenge website.

11. USEFUL RESOURCES FOR THE CHALLENGE

Open-source tools and/or information sources that can be used in the challenge are available on the challenge website.



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