IBM Quantum
Qiskit Hackathon Guide

For Universities

Contents

Hi Qiskitters!

Welcome to the Qiskit Hackathon Guide for Universities. As you start planning your campus hackathon, please reference this guide to find relevant resources and contact information. Most things you'll find here are **suggestions**. At the end of the day, you know your audience better than we do - that's why we at IBM defer to you for planning and logistics. If you disagree with something here, change it to suit your university. Just keep us in the loop!

If you only have a few minutes to read this document, skip to the TL;DR section at the end.

If you have **any questions**, comments, or concerns – please email the Education Community Manager, Brian Ingmanson, at Brian.I@ibm.com

Overview

This guide provides relevant resources and guidance as you plan a qiskit hackathon at your university. We have included IBM-specific ideas and guidance to help fill out your event and make it as successful as possible.

The term “your event” is used on purpose. Although IBM is more than happy to sponsor or support, at the end of the day this event is owned by you and your group of collaborators. We are here to help and support you along the way. As a qiskit-themed event, there are a few rules that we’d like to see put into place. If your group is on board, we’ll send swag, prizes, and even IBM Researchers as mentors and guest judges.

One good principle to always follow – **the most successful events have a theme**. Gaming, chemistry, exploring new algorithms, and adapting classical approaches are all themes we’ve seen before. You can, and should, adapt one of those for your hackathon, or create something entirely new.

A second helpful principle – **clearly state the roles** between your team of organizers, our IBM team of supporters, and the participants at your event. We like to think of it like a sports team. You and your team are the Head Coaches. You make the decisions on where, when, and who is joining. You control final say over pretty much all aspects, but you take guidance from other sources. We see ourselves at IBM as the assistant coaches, here to help where you need it, but reluctant to step on your toes. We organize the IBMers to stop by, and deal with some of the smaller details that must be managed. Finally, we look at the participants as the athletes. At the end of the day, they’re the entire reason for the event! Making sure they stay happy and engaged is crucial to the success of the entire team, and we all should work together to achieve that goal.

Let’s go team!

Code of Conduct

You are not obligated to use our IBM Code of Conduct for these events, but we do strongly suggest you use some or all of it for your event. Having a strong code of conduct helps all the participants feel they’re being treated fairly and have something to fall back on in case an issue arises. We believe everyone deserves a fair playing field, and we believe our code of conduct helps make that possible. The full Code of Conduct is available here.

Legal Agreement

IBM is interested in supporting your hackathon fully. In order to do this, we need to secure an agreement between IBM and your group. Things like GDPR, international prize law, and even invite lists

need to be agreed upon to protect both parties from any legal repercussions. Therefore, IBM can not participate in any hackathon until both parties have signed the legal agreement. If you have not already received this, please reach out to Brian.I@ibm.com

Planning the Event

We find that a vast majority of the work (and the issues) show up during the planning phase of a hackathon. Our best advice? **Plan with a team.** Having a group to rely on, delegate work to, and bounce ideas between becomes invaluable once you get into the nitty gritty details.

Work with the Community

Many people have organized qiskit hackathons at this point. This guide is just one resource you can use, but the community is always there to help. Junye Huang, a previous organizer, put together an open source GitHub with additional planning thoughts and ideas. Reaching out to the broader audience and finding out what worked for them will give you a jump start on how to plan your event. In the public qiskit slack you will get plenty of responses from the #meetups channel. If there's a Qiskit Advocate in your local area, including them as well would be a huge help.

Who to Invite

Having a mix of the right skills and personalities will make all the difference during your event. We recommend **a mix of invitations and nominations** to ensure the entire community is represented. For invitations, you can ask the heads of local physics, programming, engineering, or other related groups on

and around campus to invite a certain number of their members. You can also identify students in your classes, or who have strong passion or a record of contributing to open source communities. To get an even broader selection of participants, we strongly suggest setting up a simple nomination form in AirTable or Google Forms. The design is straightforward. We recommend it contains the following fields:

Nominee Name	Nominee Email	Reason you're nominating this person	Skills you think this person will add	Your Name	Your Email
Example name	example@abc.com	John is an exemplar student in my CS 101 class	Programming and group leadership	Professor Jane Doe	Jane@abc.edu

Again, the fields you choose to use or not to use are up to your team. When it comes to what skills you should look for at your event, we strongly recommend you have a mix of the following type of students:

Programmers, Physicists, Chemists, Artists, Computer Scientists, and Tech Enthusiasts

To further expand your pool of participants, it might be helpful to use both graduate and undergrad students. Professors can, and should, act as mentors or support members during your hackathon. However, professors should **not** be contestants in the hackathon. This can create legal issues.

The more potential participants you have, the stronger your event will be. We think at the university level, aiming for 30 – 70 people is a great range.

Sending formal invitations 3-5 weeks before your event is a solid amount of time to put everything else into place. Registration should finish at least 3 weeks before the event date. We also suggest sending an invite the week of, and the day before your event begins.

Suggested Pre-Hackathon Events

One of the things we've discovered is that hosting pre-hackathon events is extremely useful for everyone across the board. It helps keep the participants engaged and excited; it gives you as organizers a clear roadmap and milestones to hit; and it helps ensure everyone knows what they're doing.

One aspect to get out of the way early is for every participant to register through the IBM Quantum Experience and start playing around with the circuit composer. Hackathon participants need to have an IBMid created in order to participate, so this is a good early activity.

Maybe the most important workshop to hold is a qiskit 101 tutorial. We know installing and running qiskit for the first time may be a little confusing. Having someone on site to go over the steps and then walk through a few of the qiskit tutorials hosted on our public GitHub is a great introduction to qiskit.

Our Coding with Qiskit YouTube series, and our open source qiskit textbook are both popular resources that people have used to help get people up to speed. At a recent Madrid hackathon, the organizers arranged four separate meetups prior to the event to get everyone comfortable and coding with qiskit. The results were great!

Other topics you can cover in your pre-hackathon sessions are:

- What is a qubit?
- Visualizing molecules with quantum computing
- Building and playing quantum games
- How to simulate quantum errors

Rules

Qiskit Hackathons around the world always follow the same rules. We ask you use them too.

- You must use qiskit in some way in your project
- Maximum number of members per team: 5 people
- The projects must be uploaded to a public repository by the beginning of the judging time
- Teams must show off their project in some public way (elevator pitches, science fair, etc.)

While the rules are never the most exciting part of an event, it's important for all contestants to know the judging is fair. Any coaches or advisors present at the hackathon should be working with all teams; not just one. Often, a coach is also a final judge. Setting clear rules and expectations makes the entire event stronger.

Running the Event

Agenda

The agenda is the most malleable piece of a Hackathon. Some organizers opt for a 24-hour overnight hackathon, while others do a small 8-hour sprint. One team split their hackathon up into two different days to accommodate that many participants had families.

We recommend you look at your participants and decide what makes the most sense for them. The happiness and comfort of your participants is crucial. Below are two sample agendas.

Thurs, July 18th
8am - 9am: Breakfast
9am - 10am: Introduction, set rules and expectations, and provide example problems
10am - 9pm: Coding!

Thursday October 17, 2019	
Opening remarks & Tutorial	9:00 – 10:30 am
Break	
Tutorial Pt. 2	10:45 – 12:00 pm
Lunch	12 – 1 pm

Fri, July 19th
9am - 12pm: Coding!
12pm: Code freeze and lunch
2pm - 4:30pm: Presentations (~10 min each)
4:30pm: Winners announcement and awards

7:30pm: Social Event

Hands on Tutorial Pt. 3	1 – 3 pm
Break	
Team up and project planning	3:30 – 4 pm
Hackathon/coding competition	4 – 9 am (next day)
Friday October 18, 2019	
Finish Coding and break	9 – 10 am
Science Fair	10 – 11 am
Presentations	11 – 12 pm

Knowing the skill level of your audience will be essential to deciding how to intersperse the learning options. At the end of the day, hackathons are fun events that help students learn quantum and use qiskit. If your audience just finished a Quantum Information Science course on campus, you don't need as many tutorials as, say, a group of interested students with no physics background.

Another good thing to keep in mind is to **have both physics and computer science helpers** on hand. Some participants may struggle with the Python, while others need help on the core concepts of quantum physics.

Group Formation

Ok, it's the morning of your big event. A huge group of students sit in your auditorium listening to your welcome speech. Everyone is excited, brimming with ideas, waiting to get started. The only question is, how *do* you get started?

You'll find some people show up ready with an idea they want to build, and others come just looking to have fun and make something cool. We recommend doing a 60 second pitch session. This can be very informal – standing in a big circle, sitting on the stage with a microphone, or just shouting to a huddled mass of students. Each pitcher should take 60 seconds to describe the idea they have, and what kind of skills would be needed to build it. Someone pitching a new optimization tool for qiskit may need a different group than someone pitching a quantum Raspberry Pi project.

After the pitches are done, give members 5 – 10 minutes to self organize into teams they're work with for the remainder of the hackathon. This is also when the guest coaches will meet each team and get an understanding for their goals. Remember – team size should be a maximum of 5 participants.

If you're worried about a lack of pitches or project ideas, here's a list of previous hackathons and the projects that were built at each. Feel free to use those as points of inspiration.

Food

Depending on how you've arranged your schedule, you'll need to provide food to your groups. As part of signing the legal agreement, you and IBM will agree on an appropriate amount of money to be supplied

for food. A good idea is to ask each participant during the signup process to list any dietary restrictions. Pizza is always a hit, but eating healthy is fun too 😊

How to pick a winner

At a university hackathon, the way prizes are awarded should always be consistent. Although IBM sends guest coaches, we are **not the final judges.** IBM coaches can provide thoughts and insight, but the final choice needs to always be someone from your local planning team.

Below is our guidance for how judges can pick their winner.

- **Originality and Uniqueness** (25%)
    - Compared to what you've seen before, how unique is this project? How much does it challenge the assumptions of classical computing? How interesting do you find it?
- **Usefulness and Complexity** (25%)
    - Will other people be able to use this project? Was the project thoughtful in how it was designed? Can you picture yourself helping build this code further?
- **Quantum Community Benefit** (25%)
    - Will this project help the community at large? Will this project spark interest and get others involved in quantum? Will this project help others learn and understand quantum computing?
- **Presentation** (25%)
    - Did the team represent their project well? Was the team able to explain why they made certain decisions? Did the entire team get a chance to speak?

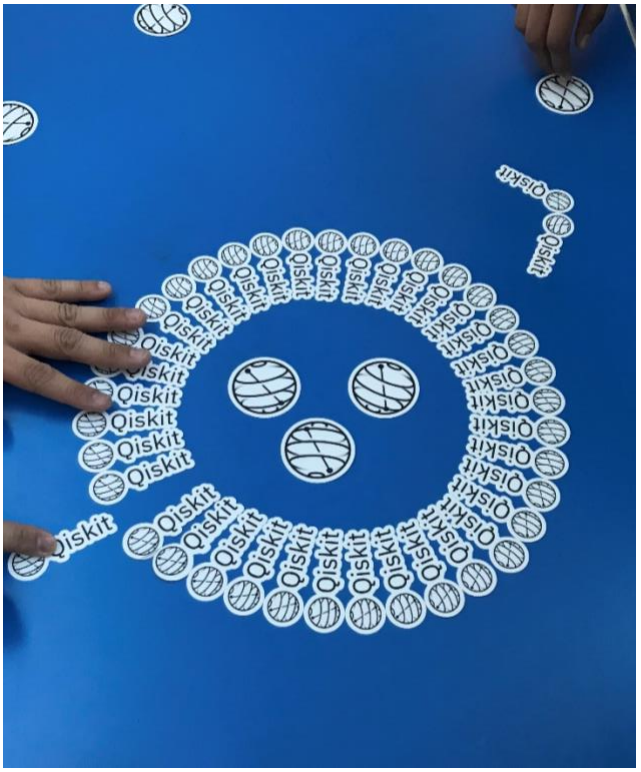
It is very important to share the above rubric with the contestants, so they know exactly what to build towards. It's also imperative for the judges to know this before the event starts, so they know what to keep an eye out for.

Speaking of judges, it's best **not to identify the judges until the end of the event**. This way no teams try to play favorites.

Finally, we think it's best if judges reserve their actual "judging" until the end of the hackathon. If a team struggles for the first 2 hours, that shouldn't be a detriment to their final product.

Prizes, Awards, and Aftermath

IBM can provide small swag for all participants, and special prizes for the winners as well. It's important to celebrate the work put in for such an event. We also suggest creating certificates of completion, or some other way for participants to show their accomplishment.



For some participants, especially game designers, the feedback is just as important as winning a prize is. Please make sure you provide time for groups to chat with judges afterwards and get this feedback. Growing the community is our main goal, and constructive feedback is key.

Most organizers feature a post-hackathon event, sometimes at a local restaurant or (age-permitting) bar as a social networking event. **We find some of the best connections happen after the event**, because of the shared experience between participants. Wherever you decide to host yours, be safe!

Finally, **please share your event pictures and social presence with us**. We'd love to see the hackathon in action. Thank you, and good luck!

TL;DR

Not everyone has time to read everything. Here are the most important pieces of advice, ordered by the strongest recommended actions at the top.

- Host a few pre-hackathon events aimed at teaching fundamentals of quantum and qiskit. Distribute the Juypter notebooks or learning materials to everyone present.
- Clearly communicate roles and responsibilities to the entire organizing team, multiple times during planning and the day-of.
- Social events help give people a break from learning and problem solving. They are your friend. They're especially helpful post-event to let coaches and participants have a longer dialogue about what worked, what didn't, and how to improve.
- Allow teams to form organically after participants pitch their ideas.
- Share the judging criteria with teams before the hackathon starts.
- Do not identify who the final judges will be until the end of the event. All organizers, judges, and coaches should act the same during the hackathon: mentoring teams and helping them solve issues
- Have a mixed crowd. Programmers, Physicists, Chemists, Artists, Computer Scientists, and Tech Enthusiasts are all great additions to a hackathon
- Make sure your venue has strong WiFi
- Have fun!