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1. National Quantum Strategy



The Government of Canada announced the launch of the National Quantum Strategy in January 2023, with the aim to amplify Canada's significant strength in quantum research; grow national quantum-ready technologies, companies and talent; and solidify Canada's global leadership in quantum science and its commercialization.

The NQS stems from Budget 2021 in which the Government announced an investment of \$360 million towards this initiative. It builds on broad consultations that took place across Canada, with key stakeholders from the quantum sector to better understand the challenges and opportunities they face. These consultations brought forward the importance for Canada to act promptly on three interrelated topics: research, talent, and commercialization, which are the three pillars that underpin the NQS. The consultations also highlighted two cross-cutting themes: (i) the importance of collaborating at the international level, and (ii) the need to quickly develop and adopt a quantum-based secure communication network.



The NQS sets out three key missions to ensure Canada stays on the path of quantum innovation and leadership:

- Make Canada a world leader in the continued development, deployment and use of quantum computing hardware and software—to the benefit of Canadian industry, governments and citizens.
- Ensure the privacy and cyber-security of Canadians in a quantum-enabled world through a national secure quantum communications network and a post-quantum cryptography initiative.
- Enable the Government of Canada and key industries to be developers and early adopters of new quantum sensing technologies.

These three missions are expected to guide collaborations between academia, industry, not-for-profit organizations and government.

To foster these missions and other quantum initiatives, the NQS is built on the three pillars referred to earlier:

- Research Supporting basic and applied research to realize new solutions and new innovations.
- Talent Developing, attracting and retaining the critical talent from within Canada and around the world to build the quantum sector.
- Commercialization Translating research into scalable, commercial products and services that can benefit Canadians, our industries and the world.

2. NSERC's Support to the National Quantum Strategy



NSERC's support to the National Quantum Strategy
NSERC's NQS funding opportunities

NSERC supports the implementation of the NQS through:
Alliance International Quantum grants
Alliance Quantum grants
Alliance Consortia Quantum grants
Collaborative Research and Training Experience (CREATE) grants

The NQS and the results of the associated consultations held by the Government of Canada informed these funding opportunities.

The funding opportunities (\$137.9M) build on NSERC's sustained investments in this field.

NSERC supports the implementation of the NQS through funding opportunities that advance Canada's research, innovation and talent development in quantum science and technology. These are:

- Alliance International Quantum grants
- Alliance Quantum grants
- Alliance Consortia Quantum grants
- Collaborative Research and Training Experience (CREATE) grants

The NQS and the results of the associated consultations held by the Government of Canada informed these funding opportunities.

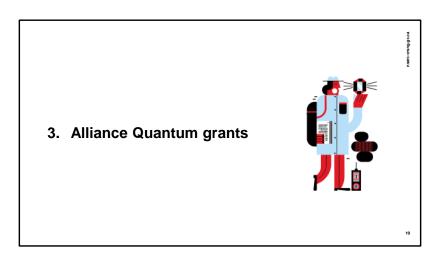
Funding Opportunity	Alliance International Quantum grants	Alliance Quantum grants	Alliance Consortia Quantum grants
Objective	Support academic researchers in Canada to establish and grow research collaborations and projects in quantum science and technology with international academic researchers.	Reinforce, coordinate and scale up Canada's domestic research capabilities in quantum science and technology through partnerships between university researchers and organizations from the private, public or not-for-profit sectors.	Develop large-scale domestic research collaborations in quantum science and technology by enhancing synergy across Canada's regional quantum research and innovation hubs, with the additional aim to connect with industrial applications and government needs.
Research topics	Thrust must advance one or more of the NOS missions through the development of any of the following technology areas or a combination thereof:		
	Quantum algorithms/encryption (incl. post-quantum cryptography) Quantum communications Quantum computing Quantum materials Quantum sensing		

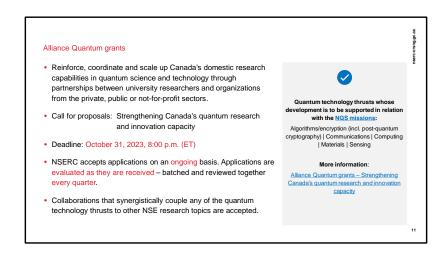
The three Alliance Quantum funding opportunities have the following objectives.

- Alliance International Quantum grants aim to support academic researchers in Canada to establish and grow research collaborations and projects in quantum science and technology with international academic researchers. Partner organizations are not required; in fact, they are not allowed.
- Alliance Quantum grants aim to reinforce, coordinate and scale up Canada's domestic research capabilities in quantum science and technology through partnerships between university researchers and organizations from the private, public or not-for-profit sectors.
- Alliance Consortia Quantum grants aim to develop large-scale domestic research
 collaborations in quantum science and technology by enhancing synergy across Canada's
 regional quantum research and innovation hubs, with the additional aim to connect with
 industrial applications and government needs.

While the three funding opportunities have complementary objectives, they share a common requirement: the proposals' thrust must aim to advance one or more of the NQS missions through the development of one or more of the specific areas of quantum technologies that are presented on this slide. Note that quantum algorithms/encryption technology area includes post-quantum cryptography.

This presentation is dedicated to Alliance Quantum grants and Alliance Consortia Quantum grants, which we will discuss in detail.





Let us now turn our attention to Alliance Quantum grants.

As just stated, these grants aim to enhance Canada's domestic research capabilities in quantum science and technology through partnerships between university researchers and organizations from the private, public or not-for-profit sectors. This funding opportunity's current call for proposals is titled Strengthening Canada's quantum research and innovation capacity.

For this call for proposals, the funding opportunity will be available and will accept applications on an ongoing basis until October 31, 2023, 8:00 p.m. (ET), and you may submit your application at any time. Applications are evaluated as they are received. They are batched and reviewed together every quarter through a competitive process.

It is important to emphasize again that NSERC will only accept proposals whose thrust aims to advance one or more of the NQS missions through the development of the specific areas of quantum technologies referred to earlier, which are listed again on this slide.

Of note, collaborations that synergistically couple any of the quantum technology thrusts to other research topics in the natural sciences and engineering are accepted.

Alliance Quantum grants Funding Grant value and duration: \$50,000 to \$500,000 (previously \$300,000) per year; up to 5 years NSERC provides support for 100% of the eligible costs of research. Partner organizations You may involve whichever partner organizations you need to achieve the project's research goals and successfully mobilize the research results to achieve the desired impact. You must have at least one partner organization whose cash contributions would be recognized for cost sharing, had there been any required. All partner organizations must actively play a role in the project and support it through in-kind contributions. At least one partner organization must have the ability to exploit the project's research results. Other funding organizations (e.g., other provincial or federal funding agencies) may participate as financial partners and provide support to the project in addition to NSERC. More information about role of partner organizations? Alliance grants - Role of partner organizations

In terms of funding, you can request \$50,000 to \$500,000 per year from NSERC for up to five years. Please note that the upper limit, \$500,000 per year, represents an increase with respect to the amount previously allowed in this call for proposals.

The participation of partner organizations is required. These organizations can be private, public or not-for-profit, and you may involve whichever partner organizations you need to achieve the project's research goals and successfully mobilize the research results to achieve the desired impact. Note that partner organizations may include Canadian federal departments or organizations that perform R&D, as well as anticipated end users of your project's targeted quantum technologies.

Cash contributions from partner organizations are not required, as NSERC provides support for all eligible costs of research. Still, you must have at least one partner organization whose cash contributions would be recognized for cost-sharing with NSERC, had there been any required. What does that mean? It means that at least one partner organization must satisfy specific requirements depending on its type and sector for it to be recognized for cost-sharing purposes with NSERC. These requirements are detailed on the Alliance grants: Role of partner organizations web page, which we invite you to consult.

Also, each partner organization – recognized or not for cost-sharing with NSERC – must actively play a role in the project and support it through in-kind contributions. Such involvement must be achieved by doing at least one of the following:

- play an active role in the project's research activities;
- utilize the project's research results to help achieve its desired outcomes; or
- play an active role in translating or mobilizing knowledge to ensure that the research results have an impact

Note that various in-kind contributions could be made toward the project, such as the time of the partner organization's scientific, engineering or technical staff to provide direction and participate in the project; provision of equipment, materials or services; and provision of access to special equipment or data.

Further, at least one of the partner organizations must have a demonstrated ability to exploit the project's research results, while other partners may be chosen for their ability to generate and

mobilize knowledge.

Lastly, other funding organizations (e.g., other provincial or federal funding agencies) may participate as financial partners and provide support to the project in addition to NSERC. In such a case, you must include all the project's direct costs funded by sources other than NSERC in your proposal budget table and explain them, as they are considered in the merit assessment of the proposal. Of course, active participation in the project and in-kind contributions are not required from funding organizations that provide financial support to the project alongside NSERC.

Alliance Quantum grants

• Who can apply

• You can apply as applicant or co-applicant if you are a Canadian university researcher eligible to receive NSERC funds.

• You may apply for multiple Alliance Quantum grants as an applicant or co-applicant to support separate projects. The grants must cover distinct expenses.

• NSERC encourages the participation of early career researchers as applicants or co-applicants.

• When to apply

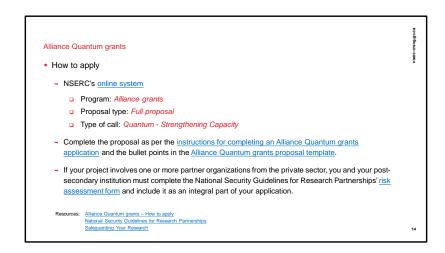
• Any time until deadline of October 31, 2023, 8:00 p.m. (ET)

If you are interested in these grants, and you are a Canadian university researcher who is eligible to receive NSERC funds, you can apply on your own or as a team with co-applicants who are also eligible academic researchers.

Note that you may apply for multiple grants as an applicant or as a co-applicant in order to support separate projects. The grants must cover distinct expenses; there must be no duplication of funding.

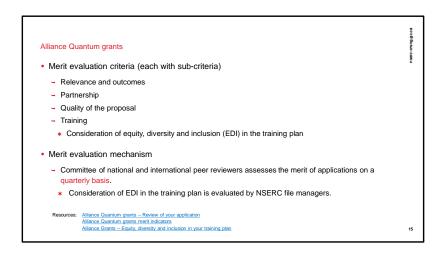
Furthermore, NSERC encourages the participation of early career researchers as applicants or co-applicants on Alliance Quantum grant applications. While applications led by early career researchers are assessed using the same evaluation criteria, the merit indicators used for the assessment include provisions for cases where the applicant's experience in managing projects or mentoring trainees is nascent. This is consistent with NSERC's aim to effectively support researchers throughout their careers.

As mentioned earlier, you may apply at any time until October 31, 2023. Applications will be evaluated as they are received, and funding decisions are made on a quarterly basis. We would like to emphasize that you do not need to wait until the deadline to submit your application. The committee of peer reviewers who make the final recommendations to NSERC meets every quarter. The committee's next meeting is scheduled in June. Its subsequent meeting will normally be in September, well ahead of the submission deadline. After the deadline, there will be an additional meeting in the late fall or early winter.



Your application must be submitted through NSERC's online system. Please ensure that you select the appropriate Alliance grants' type of call (Quantum - Strengthening Capacity), and that you complete your proposal while following the instructions and addressing the bullet points in the proposal template. Please refer to the web page of this funding opportunity for more details.

Also, please keep in mind that in the case where your project involves one or more partner organizations from the private sector, you and your post-secondary institution must complete the National Security Guidelines for Research Partnerships' risk assessment form and include it as part of your application.



The merit of any Alliance Quantum grant proposal is assessed using the Alliance Quantum evaluation criteria. As you may know, each criterion has a few sub-criteria for a total of 11. The Alliance Quantum merit indicators are used to rate each evaluation sub-criterion.

All proposals undergo peer review. As indicated earlier, a committee of national and international peer reviewers assesses the merit of applications on a quarterly basis. The members may be informed in their assessment by reports from external reviewers.

Note that the merit evaluation of the sub-criterion related to the consideration of equity, diversity and inclusion (EDI) in the training plan is evaluated by NSERC file managers.

Alliance Quantum grants

• Risk assessment

• If your project involves at least one private sector organization, NSERC reviews the National Security Guidelines for Research Partnerships' risk assessment form provided with your application.

• When additional expertise is required, NSERC seeks advice from Canada's national security departments and agencies.

• Funding decision and post-award progress reporting

• Merit indicator ratings assigned to applications allow the selection of proposals for funding on a competitive basis.

• When applicable, decisions stemming from the national security risk assessment are based on the risks identified and the mitigation measures proposed.

• Assessment time: 12 to 24 weeks

• If your project is funded, you must report on progress of project's research and training activities.

• Including implementation of practices to support EDI in training plan

As stated earlier, if your project involves one or more private sector organizations, NSERC reviews the National Security Guidelines for Research Partnerships' risk assessment form that you provide with your application. When additional expertise is required, NSERC seeks advice from Canada's national security departments and agencies.

Meritorious proposals are selected for funding on a competitive basis, using the merit indicator ratings assigned to applications. NSERC's final funding decision takes into consideration the merit evaluation, as well as the assessment of potential risks for Canada's national security, when applicable.

If your project is funded, you will be asked to report on progress of the project's research and training activities, including the implementation of practices to support EDI in your training plan.

Alliance Quantum grants

Leveraging of Alliance Quantum awards by Alberta Innovates' Campus Alberta Small Business Engagement program—Stream II

Through its Campus Alberta Small Business Engagement (CASBE) program—Stream II, Alberta Innovates may leverage NSERC Alliance Quantum grants to provide additional support.

Projects must be led by NSERC-eligible researchers from Alberta universities and involve a for-profit small or medium-sized enterprise (SME) incorporated or registered in Alberta.

Leverage of NSERC's award up to \$150,000 per year for up to two years.

CASBE support could be for a maximum of two years; however, your Alliance Quantum grant application can request NSERC support for up to five years.

For additional information and application instructions, refer to Alberta Innovates' CASBE program guide. You may also consult the Alliance Quantum grants — How to apply web page.

To conclude this part of the presentation, we would like to bring to the attention of Alberta-based researchers that, for fiscal year 2023–24, Alberta Innovates is pleased to continue to offer, through its Campus Alberta Small Business Engagement (CASBE) program—Stream II, the possibility to leverage NSERC Alliance Quantum grants by providing additional support toward projects led by NSERC-eligible researchers from Alberta universities and involving a for-profit small or medium-sized enterprise (SME) incorporated or registered in Alberta.

Alberta Innovates' CASBE program will leverage NSERC's award up to \$150,000 per year for up to two years. Note that your Alliance Quantum grant application is not limited to this duration, and you can request NSERC support for up to five years.

For additional information and application instructions, refer to Alberta Innovates' CASBE program guide. You may also consult the Alliance Quantum grants – How to apply web page.

3. Alliance Consortia Quantum grants





Let us now discuss Alliance Consortia Quantum grants.

Canada's investments to date in this field have created significant strengths in quantum science across the country, particularly in a few quantum research and innovation hubs, which are geographic areas where key quantum ecosystem players, including universities, companies and other types of organizations, are clustered together. These regional hubs are the following geographic areas:

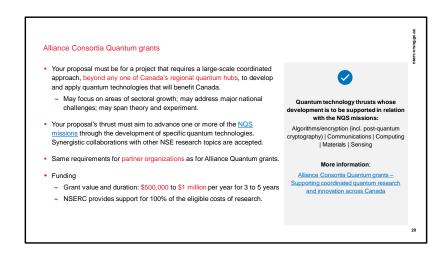
- Greater Vancouver area, British Columbia
- Calgary-Edmonton corridor, Alberta
- Waterloo-Toronto-Ottawa corridor, Ontario
- Montreal-Sherbrooke-Quebec City corridor, Quebec

As stated earlier, Alliance Consortia Quantum grants aim to support the development of large-scale domestic research collaborations in quantum science and technology by enhancing synergy across these hubs, with the additional aim to connect with industrial applications and government needs. Such aim is to be achieved through collaborations between university researchers and partner organizations from the private, public or not-for-profit sectors, including Canadian federal departments or organizations that perform R&D, as well as anticipated end users of quantum technologies.

As is the case for Alliance Quantum grants, this funding opportunity is delivered through calls for proposals, of which this is the second.

For this call for proposals, applications will be accepted at any time until October 16, 2023, 8:00 p.m. (ET).

All applications will be reviewed together through a competitive peer review-based process, with NSERC funding decisions being made in late winter 2024.



If you are considering applying to this funding opportunity, please take note that your proposal must be for a project that requires a large-scale coordinated approach, beyond any one of Canada's regional quantum hubs, to develop and apply quantum technologies that will benefit Canada.

Also, like Alliance Quantum grants, NSERC will only accept proposals whose thrust aims to advance one or more of the NQS missions through the development of any of the same quantum technologies mentioned earlier or a combination thereof. Here too, collaborations that synergistically couple any of the quantum technology thrusts to other research topics in the natural sciences and engineering are accepted.

In terms of funding, you can request \$500,000 to \$1 million per year from NSERC for 3 to 5 years, and even though the participation of partner organizations is required, NSERC provides support for all eligible costs of research. Cash contributions from partner organizations are not required. Each partner organization must, however, actively play a role in the project and support it through in-kind contributions. The requirements for partners organizations are the same as those we discussed for Alliance Quantum grants.

Alliance Consortia Quantum grants

• Who can apply

• If you are a Canadian university researcher eligible to receive NSERC funds, you can apply with a team of co-applicants who are also academic researchers.

• Your research team must include eligible academic researchers from universities located in two or more of Canada's regional quantum research and innovation hubs.

• The team may also involve eligible academic researchers from universities outside these hubs.

• You may apply for only one Alliance Consortia Quantum grant as the principal applicant.

• When to apply

• Any time up until deadline of October 16, 2023, 8:00 p.m. (ET)

If you are interested in these grants, and you are a Canadian university researcher who is eligible to receive NSERC funds, you can apply with a team of co-applicants who are also eligible academic researchers. Your research team must include eligible academic researchers from universities located in two or more of Canada's regional quantum research and innovation hubs. The team may also involve eligible academic researchers from universities outside these hubs.

Please take note that you may apply for only one Alliance Consortia Quantum grant as the principal applicant.

As mentioned earlier, you may apply at any time until October 16, 2023.

Alliance Consortia Quantum grants

- If you hold an active Alliance Consortia Quantum grant from your participation as an applicant or co-applicant for a previous call for proposals, and you intend to submit a new application to this call:
 - You must discuss and explain in your new proposal any relationship and/or overlap, conceptual or financial, between the two applications. Otherwise, your new proposal will not be accepted.
 - This information will be considered in the merit assessment of your new application.
- You may concurrently apply, as an applicant or co-applicant, to other Alliance funding opportunities, including Alliance Quantum grants, to support separate projects.
 - The grants must cover distinct expenses; no duplication of funding is permitted.

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Please note that if you hold an active Alliance Consortia Quantum grant from your participation as an applicant or co-applicant for a previous call for proposals, and you intend to submit a new application to this call, you must discuss and explain in your new proposal any relationship and/or overlap, conceptual or financial, between the two applications. Otherwise, your new proposal will not be accepted. This information will be considered in the merit assessment of your new application.

Also, we want to emphasize that while applying as an applicant or co-applicant to an Alliance Consortia Quantum grant, you may also submit applications to other Alliance funding opportunities, including Alliance Quantum grants, to support separate projects. Of course, the grants must cover distinct expenses, and there must be no duplication of funding.

Alliance Consortia Quantum grants

• How to apply

• NSERC's online system

□ Program: Alliance grants

□ Proposal type: Full proposal

□ Type of call: Consortia Quantum - Coordinated research and innovation

• Complete the proposal as per the instructions for completing an Alliance Quantum grants application and the bullet points in the Alliance Quantum grants proposal template.

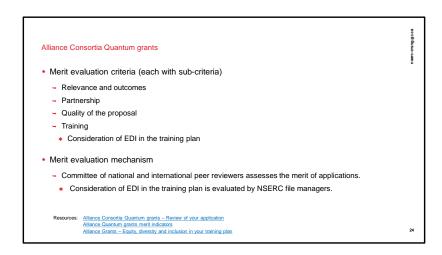
• If your project involves one or more partner organizations from the private sector, you and your post-secondary institution must complete the National Security Guidelines for Research Partnerships' risk assessment form and include it as an integral part of your application.

Resources: Alliance Consortia Quartum grants – How to apply.

National Security Guidelines for Research Partnerships
Safeguarding Your Research

Your application must be submitted through NSERC's online system. Please ensure that you select the appropriate Alliance grants' type of call (Consortia Quantum - Coordinated research and innovation), and that you complete your proposal while following the instructions and addressing the bullet points in the proposal template. Please refer to the web page of this funding opportunity for more details.

Also, please keep in mind that in the case where your project involves one or more partner organizations from the private sector, you and your university must complete the National Security Guidelines for Research Partnerships' risk assessment form and include it as part of your application.



The merit of any Alliance Consortia Quantum grant proposal is assessed using the Alliance Quantum evaluation criteria, and the Alliance Quantum merit indicators are used to rate each evaluation sub-criterion.

All proposals undergo peer review, with a committee of national and international peer reviewers assessing the merit of applications. The committee members are normally informed in their assessment by reports from external reviewers. Also, the merit evaluation of the sub-criterion related to the consideration of EDI in the training plan is evaluated by NSERC file managers.

Alliance Consortia Quantum grants
 Risk assessment
 Similar process to that for Alliance Quantum grants in the case where your project involves at least one private sector organization.
 Funding decision and post-award progress reporting
 Merit indicator ratings assigned to applications allow the selection of proposals for funding on a competitive basis.
 NSERC's funding decision takes into consideration the merit evaluation and the assessment of

potential risks for Canada's national security, when applicable.

If your project is funded, you must report on progress of project's research and training

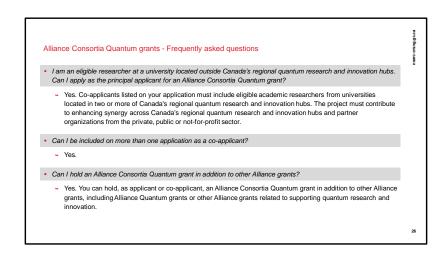
 If your project is funded, you must report on progress of project's research and training activities.

* Including implementation of practices to support EDI in training plan

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NSERC's funding decision takes into consideration the merit evaluation as well as the assessment of potential risks for Canada's national security, when applicable, with meritorious proposals being selected for funding on a competitive basis using the merit indicator ratings assigned to applications.

Also, if your project is funded, you will be asked to report on progress of the project's research and training activities, including the implementation of practices to support EDI in your training plan.



To conclude the presentation, let us review a few frequently asked questions about Alliance Consortia Quantum grants.

Alliance Consortia Quantum grants - Frequently asked questions

- I currently hold (as an applicant or co-applicant) an active Alliance Consortia Quantum grant from a previous call.
 Can I participate as an applicant or co-applicant in a new Alliance Consortia Quantum grant application in response to a new call for proposals?
 - Yes. While participating as an applicant or co-applicant in an Alliance Consortia Quantum grant, you can participate as an applicant or co-applicant on an Alliance Consortia Quantum grant application in response to a new call for proposals, but you must discuss and explain in your new proposal any relationship and/or overlap, conceptual or financial, between the two applications. Otherwise, your new proposal will not be accepted. This information will be considered in the merit assessment of your new application.
- Are the regional quantum research and innovation hubs formal organizations? Is formal membership in such hubs required?
 - No. The regional quantum research and innovation hubs are only designations of geographic areas across Canada. They are not organizations and there is no membership.

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Alliance Consortia Quantum grants - Frequently asked questions

- Is it necessary for the partner organizations participating in my Alliance Consortia Quantum grant application to be situated in the same regional quantum research and innovation hubs as members of the academic team?
 - No. The partner organizations involved in your application can be situated anywhere across Canada irrespective of
 the geographic location of the applicant's or co-applicants' institutions. Consult the <u>Alliance grants: Role of partner
 organizations</u> web page for complete guidelines regarding partner organizations.
- Are there any constraints or obligations with respect to the intellectual property (IP) that may be generated in an Alliance project?
 - NSERC claims no rights of ownership to IP associated with an award. It is a best practice for all collaborating
 parties to enter into a Research Agreement that outlines an IP arrangement and the obligations of all partner
 organizations involved in the project. The ownership and protection of IP must be carried out according to the
 principles described in NSERC's <u>Policy on Intellectual Property</u>.

Consult the <u>Alliance Consortia Quantum grants Resources</u> web page for additional guidance and information that may help you prepare your application.

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