How do I get an Allocation?
How do I get time on an HPC system and what is available?

You must submit a proposal for a project in order to gain access to an HPC system. We have two resources available – one director discretionary at University of Tennessee's JICS/NICS center. The second is through XSEDE – a group computers housed across the country funded by the National Science Foundation to support open science.
JICS/NICS System Descriptions

**Nautilus** – An SGI Altix UV1000 system with 1024 cores (Intel Nehalem EX processors), 4 TB of global shared memory, and 8 GPUs in a single system image. It also has 4 UV 10 Harpoon Nodes that contain 32 cores, 128 GB of memory and 2 GPU’s per node.

**Darter** – A Cray XC30 supercomputer equipped with 2 Intel Xeon ES-2670 processors (16 cores total) and 32 GB of RAM on each of its 748 nodes.

**Beacon** – A Cray CS300 development cluster equipped with 2 Intel Phi coprocessors 5110P 256GB of RAM, and 960 GB of SSD storage on each of its 48 compute nodes.

*Allocated differently through an open call*
**XSEDE System Descriptions**

**Stampede** – Dell PowerEdge C8220 cluster with Xeon Phi coprocessors. At TACC

**Gordon** – Appro cluster with Intel Sandy Bridge. At SDSC

**SuperMIC** – Dell cluster with Intel 64 processors. At LSU

**Trestles** – Appro cluster with AMD Magny-Cours processors. At SDSC

**Blacklight** – SGI Altix UV with Intel Xeon X7560 (Nehalem) processors. At PSC

* **Darter** – Cray XC30 with Intel ES-2670 processors. At NICS

* **Nautilus** – SGI Altix UV1000 with Intel Nehalem EX processors. At NICS

Additional smaller systems and some soon to be available. Check [https://www.xsede.org/resources/overview](https://www.xsede.org/resources/overview) for updates.

* Currently only available through XSEDE for supplements and transfers.
**NICS Director Discretionary Project Types**

- **Pilot** - Initial projects. These are used to get code ported and tested as well as work on scaling, etc. These are used to determine the appropriate amount of the resource to request.

- **Standard** - Larger awards that are ready for implementation.

- **Large** - (Available only on Darter) For established users with proven need for large allocations.

- **EOT** - Intended for workshops and classes.
XSEDE Project Types

**Startup** - Initial projects. These are used to get code ported and tested as well as work on scaling, etc. These are used to determine the appropriate amount of the resource to request.

**Research** - Larger awards that are ready for implementation.

**Campus Champion** – Bring awareness of HPC to campuses, host training workshops, help users to prepare for startup allocations, etc.

**Educational** - Class instruction and training activities.
### Who Qualifies to be the Primary Investigator on a Project?

<table>
<thead>
<tr>
<th>NICS Discretionary</th>
<th>XSEDE Start up</th>
<th>XSEDE Scientific Research</th>
<th>Class or workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD required</td>
<td>Yes*</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Also, University of Tennessee faculty, staff and department heads.</td>
<td>Also NSF fellows and some XSEDE staff</td>
<td>No</td>
</tr>
<tr>
<td>Open Science</td>
<td>Yes *</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Limited to US Universities</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Exceptions such as industrial, vendor and partners
## NICS Director Discretionary Allocation size guidelines

<table>
<thead>
<tr>
<th>Resource</th>
<th>Standard Per Year</th>
<th>Pilot Per Year</th>
<th>EOT Per Event</th>
<th>Large Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nautilus</td>
<td>150,000</td>
<td>30,000</td>
<td>1,000</td>
<td>N/A</td>
</tr>
<tr>
<td>Darter</td>
<td>1,000,000</td>
<td>200,000</td>
<td>5,000</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Beacon</td>
<td>5,000</td>
<td>500</td>
<td>50-100</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**XSEDE** – Varies by machine, only clear limit is Startup projects should be limited to no more than 200,000 Units.
## Project Readiness and Duration

<table>
<thead>
<tr>
<th></th>
<th>NICS Pilot and XSEDE Start up</th>
<th>NICS Standard and XSEDE Scientific Research</th>
<th>NICS EOT or XSEDE Educational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience level</td>
<td>Low/Med</td>
<td>High</td>
<td>Low/Medium</td>
</tr>
<tr>
<td>Scaling Data</td>
<td>To acquire</td>
<td>Necessary</td>
<td>N/A</td>
</tr>
<tr>
<td>Life of Project</td>
<td>12 months non renewable*</td>
<td>12 months - renewable</td>
<td>12 months</td>
</tr>
<tr>
<td>Award schedule</td>
<td>Anytime</td>
<td>NICS Anytime</td>
<td>Anytime</td>
</tr>
<tr>
<td>Resource request limits</td>
<td>NICS see above chart. XSEDE Maximum 200,000 across all resources</td>
<td>NICS, see above chart. XSEDE no stated limit.</td>
<td>Minimal</td>
</tr>
</tbody>
</table>

*Do not need to wait for NICS Pilot or XSEDE start up to expire before applying for full award.
What is required to apply for a project? NICS DD

**Pilot** – CV of PI and co-PI. Brief overview of proposed work and why it is important. 1 to 3 pages of proposed work, software requirements, justification, data requirements, etc. For full requirements see: [https://www.nics.tennessee.edu/accounts/application-form-pilot](https://www.nics.tennessee.edu/accounts/application-form-pilot)

**Standard** – All of the above plus intellectual merit, scaling data, broader impact and results of prior awards. Full requirements are at: [https://www.nics.tennessee.edu/accounts/application-form-research](https://www.nics.tennessee.edu/accounts/application-form-research)

**EOT** – CV, overview. See: [https://www.nics.tennessee.edu/accounts/application-form-eot](https://www.nics.tennessee.edu/accounts/application-form-eot)
What is required to apply for a project? XSEDE

**Startup** – The request process requires a CV and short abstract. The PI should assess the amount of time that will be necessary to accomplish the computational project. If you are just getting started and not certain of your computational needs, then apply for a Startup allocation request. For a project that requires a significant amount of time or data storage, apply for a Research allocation.

**Educational** – Education allocations follow the same process as Startup allocations, save that the PI must justify the need for the resource based not only on its architecture (as needed for each type of project) but also the amount of disjoint work students will perform on the resource (since nodes cannot be shared between users), being cognizant to not exceed the [startup allocation limit](https://portal.xsede.org/allocations-overview#writing-startupeducation) for the resource. Note the approximate number of students along with the number and approximate computational resource requirements for each project (e.g., one node per student for one hour, etc.).

**Research** – Well written requests contain all the information the review panel requires to assess your project qualifications. Details for writing a request to use any XSEDE resource are available in the XSEDE Resource Allocation Policies. Sample Research allocation requests are available as examples of how requests should be presented. For more see: [https://portal.xsede.org/allocations-overview#writing-startupeducation](https://portal.xsede.org/allocations-overview#writing-startupeducation)
What is required reporting for a project?

NICS DD:

All publications or presentations should be entered in the JICS database at: https://portal.jics.utk.edu/publications/

Pilot – At 6 months or 50% usage provide a highlight.
  At 12 months or project completion provide a report.

Standard – At 6 months or 50% usage provide a highlight
  At 9 months or 75% usage provide a highlight
  At 12 months or project completion provide a final report.

EOT – At completion of event provide feedback regarding the experience with the workshop or class.

XSEDE: All publications and results must be included for any further awards.
What does a good proposal look like?

XSEDE – examples of good proposals in various fields can be found at:

   Educational and Startup:
   https://portal.xsede.org/allocations-overview#writing-startupeducation-examples

   Research:
   https://portal.xsede.org/allocations-overview#writing-research

NICS – No formal database. However, an example of a resource justification would look like:
What does a computational plan look like?

A good computational plan will provide scaling data and justify the amount of CPU time needed to complete each phase of the study for each resource requested. An example below.

For CMAQ simulations, Figure 3 (a) and (b) shows that efficiency drops with the increasing processor numbers both 12 km and 4km domains. Thus, 12 processors will be used for 12 km domain simulations. The 4 km domain contains 600 by 400 horizontal grids, which makes it impossible to run under 48 processors. Issues such as out of memory come out when we test using 36 processors or less. Thus, Figure 3 (b) shows the efficiency tests with 48 processors or more and 48 processors will be used for the simulations. It takes 9276 and 46720 service units simulations for the two domains, respectively. For five scenarios a total of 279,908 (9276+46720)x5) service units are required for CMAQ simulations.
Which allocation do I apply for?????

Questions to ask to help determine your choice:

What hardware will my best suite my needs?
What software is available on the machine?
Is my code ready to run and am I prepared to proceed to my research?
-- If no consider a NICS Pilot discretionary or XSEDE start up
Do I have scaling data (how efficiently can I use the system)?
Do I need a large amount of resource time?
How quickly do I want to get started?
Will my research be ongoing for several years or several months?
Is this to teach a class or workshop?
Which allocation do I apply for?????

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How do I apply for a project?
How do I gain access to an existing project?

NICS Projects:

To apply for a NICS Discretionary project fill out the application at https://portal.nics.tennessee.edu/accounts/request

Q. If there is an existing NICS Discretionary project how can I get access?

A. Also go to https://portal.nics.tennessee.edu/accounts/request - you will then have to change the first drop down to either “Add a New User to an Existing Project” OR if you have EVER had an account at NICS change it to “Add an Existing NICS User to an Existing Project” and fill out the rest of the form. The PI will then have to approve access and the process will begin.

Q. What about Beacon? I see it there but you mentioned an “open call”.

A. Yes, original Beacon requests should be submitted through the open call process first. See https://www.jics.tennessee.edu/aace/beacon/open-call for details.

XSEDE Projects:

First you must create an XSEDE User Account at https://portal.xsede.org
Once created see https://www.xsede.org/allocations for information regarding allocations and instructions on how to apply.

Q. If there is an existing XSEDE project how do I get access?

A. Also create an XSEDE User Account. Give the PI your XSEDE User name and request he/she grant you access.