Data Center Application and Equipment Hosting Services
Effective April 1, 2009
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This document outlines the services NUIT provides from the central data centers to host applications and equipment required for University administration and research. The primary responsibilities of the central data centers are to protect information, support applications, and support research in a secure and managed environment.

As a general rule, NUIT will implement administrative applications as guest hosts of the common computing and storage platform unless there are clear technical requirements to do otherwise. Research hosting will be specialized equipment.

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1. Practices related to hosting services in the central data centers
The following practices are applicable to any application or equipment hosted in the central data centers.

- Practice on Locating Administrative Applications or Equipment in Central Data Centers
- Practice on Locating Research Applications or Equipment in Central Data Centers
2. Standard administrative equipment hosting services

The standard administrative equipment hosting services reflect the placement of equipment in the data centers as a security and reliability measure, with resources in the owner department handling most administrative and technical support duties. NUIT is available to provide some assistance.

a. The service includes:

   i. Design and installation coordination services:
      1. NUIT staff will consult with the requester to
         a) Design the best fit of equipment and operating system software for the requirement;
         b) Recommend equipment and maintenance services from its standard vendors;
         c) Recommend a storage architecture to match the application’s need for capacity and backups
d) Classify each piece of equipment as either PROD, DEV or TEST, which will indicate how equipment will be handled in a disaster or extraordinary maintenance activities.
         1. PROD (Production) – NUIT will work to sustain the equipment through a disaster or extraordinary maintenance activity. Failing that, the equipment will be a high priority to restore to service when that is possible.
         2. DEV (Development) – NUIT will not attempt to preserve services through a disaster or extraordinary maintenance activity and may shut down the equipment to reduce power or cooling loads. NUIT may repurpose the equipment as part of a disaster recovery plan to restore PROD services. In the case of a service outage, restoration of DEV services is a low priority.
         3. TEST – NUIT will not attempt to preserve services through a disaster or extraordinary maintenance activity and may shut down the equipment to reduce power or cooling loads. NUIT may repurpose the equipment as part of a disaster recovery plan to restore PROD services. In the case of a service outage, restoration of TEST services is the last priority.

   2. If desired by the requester, NUIT will transact the purchase of the equipment.
   3. NUIT will oversee equipment delivery, basic installation, testing and acceptance.
   4. If desired by the requester, NUIT will install and configure the operating system, utility software, and storage system linkage to data center services.
   5. If desired by the requester, NUIT will add the equipment to its existing master maintenance contracts and charge the maintenance fee annually to the requester.
   6. If desired by the requester, NUIT will evaluate and recommend options for high-availability and disaster recovery; however, ultimately those options must be funded by the requester.

   ii. Floor space and equipment racks
      1. Standard 19” equipment racks with universal mounting rails provided by NUIT – equipment should be delivered for assembly into racks on site

   iii. Power
      1. Electrical power at 480V or 208V AC only.
2. Monitored, addressable CDUs provided by NUIT.
3. Uninterruptable power for 10 minutes after a commercial power failure.

iv. Cooling
1. All necessary cooling provided for designs of up to 8kW per rack. Any equipment requiring greater than 8kW per rack will be accommodated only on a separate construction agreement to add specialized power and cooling capacity.

v. Network connectivity
1. Standard 1Gbps Ethernet connectivity of up to two connections per physical interface.

vi. Network security
1. Standard firewall screening
2. Standard intrusion prevention screening

vii. Physical security
1. Equipment is isolated in a portion of the facility accessible only to NUIT staff.
2. NUIT procedure for access to the facility including submission of an access request form must be completed and followed by all occupants and their approved vendors.
3. Higher security requirements can be addressed under special operating agreements.
4. Environmental monitoring 7x24x365.
5. Unless the equipment is under the master maintenance contracts, NUIT will permit access to the equipment by approved vendors only upon notification from the equipment owner.
6. Facility is under camera surveillance that complies with NU’s video recording and surveillance policy.
7. Overall health of the facility is checked through daily site visits.
8. Automatic notification to hosted equipment when commercial power or cooling been off for three minutes, or low-battery alarm, to allow for orderly shutdown before power shut off (requires installation of software agent).

viii. Facility Maintenance
1. Routine servicing of power and cooling equipment and facility cleaning will be performed by authorized vendors under a University Master agreement.
2. Standard preventative maintenance will be performed during normal business hours without interruption to the facility’s operation.
3. Special load and stress testing of infrastructure equipment disruptive to the facility’s operation will be performed at a date/time deemed by NUIT with a 10-day advance notice to equipment owners.

ix. Data backup
1. For classes of data housed within central information storage services, NUIT will execute its normal backup procedures that apply to each class.

x. Technical support for equipment administration
1. If the equipment has been included into the NUIT master maintenance contracts and the equipment can be monitored by NUIT systems, then, with the equipment owner’s agreement, NUIT will configure its equipment management system to monitor the hardware and automatically notify the owner of alarm conditions.
The equipment owner can request that NUIT call for maintenance of the equipment.

xi. Performance monitoring
   1. If requested by the equipment owner, and only if the equipment can be monitored by NUIT systems, then NUIT will configure its performance monitoring systems to gather data about performance of the applications on the equipment. Reports will be available to the business unit and application owner from a secure Web site (PROD only)

b. Exclusions:
   i. Generator backup for commercial power in not included. Conditioned power, with 10 minutes of battery backup time, is the only electrical service available.
   ii. Equipment maintenance is not included. Except as described in paragraph 2.a)ix above, the equipment owner is responsible for any necessary maintenance contracts. Access to the equipment by a maintenance contractor must be arranged with NUIT in advance.
   iii. Software maintenance is not included. The equipment owner is responsible for all software used on the equipment, including licensing, updates, configuration and protection against intrusion or corruption. Failure to maintain software may result in threat conditions that will cause NUIT to shutdown the equipment.
   iv. Backup of mass storage within the equipment is not included. By design, information storage services of the data center are managed centrally and are backed up in a central fashion. No backup services are available for separate storage devices within individual equipment. Equipment owners are strongly urged to use central information storage services. Equipment owners are specifically cautioned against planning to backup their storage to locations outside the data center because of bandwidth limitations.
   v. Equipment replacement is not included. Equipment replacement necessary due to failure, disaster, or technical obsolescence is the responsibility of the equipment owner.
   vi. Technical support for equipment administration is not included. The equipment owner must provide staff skilled in the administration of the equipment.

c. Service Fees
   i. There is currently no fee for this service. The University reserves the privilege of determining whether fees would be appropriate in the future.

3. Enterprise administrative equipment hosting services

This service is an extension of the standard service for enterprise systems for which the University has allocated sustaining funding to NUIT. All of the individual aspects of the standard service apply to enterprise service, with additional functions fulfilled by NUIT.

a. The service includes (see standard service above with modifications):
   i. Design and installation coordination services
      1. NUIT staff will consult with the requester to
         a) Design the necessary resources and best operating system software for the application, taking into consideration the necessary continuity of service over equipment failures or maintenance;
         b) Recommend equipment and maintenance services from its standard vendors;
         c) Recommend a storage architecture to match the application’s need for capacity and backups
d) Classify each piece of equipment as either PROD, DEV or TEST, which will indicate how equipment will be handled in a disaster or extraordinary maintenance activities.

i. PROD (Production) – NUIT will include the application in its institutional disaster response architecture and operating plan, which emphasizes continuity of services despite disrupting events. In all cases, enterprise applications will be the highest priority to restore to service when that is possible.

2. NUIT will transact the purchase of the equipment.

3. Unchanged.

4. NUIT will install and configure the operating system, utility software, and storage system linkage to data center services.

5. NUIT will add the equipment to its existing master maintenance contracts and charge the maintenance fee annually to the requester.

6. Unchanged.

ii. Floor space and equipment racks – unchanged.

iii. Power

1. Unchanged.

2. Power services after a commercial failure relate to system status:

   e) PROD - Uninterruptable power with generator backup.

   f) DEV and TEST - Uninterruptable power for 10 minutes.


v. Network connectivity – unchanged

vi. Network security – unchanged

vii. Physical security – unchanged

viii. Facility maintenance – unchanged

ix. Data backup

1. Unchanged.

2. If desired by the requester, NUIT will backup storage internal to the equipment for disaster recovery purposes (PROD only).

x. Technical support for equipment administration

1. NUIT will configure its equipment management system to monitor the hardware and address problems as they occur. NUIT will call for vendor support as needed to correct problems.

2. NUIT will proactively maintain the equipment, its software, and configuration based upon its standard practices.

xi. Performance monitoring, capacity planning, equipment refresh

1. If requested by the equipment owner, and only if the equipment can be monitored by NUIT systems, then NUIT will configure its performance monitoring systems to gather data about performance of the applications on the equipment. Reports will be available to the business unit and application owner from a secure Web site (PROD and TEST only)

2. Based upon performance, capacity, and equipment useful-life, NUIT will recommend and fund replacement of the equipment. Replacement will be coordinated with the business unit and application owner.

xii. Software maintenance
1. NUIT will maintain all operating system and security software, including licensing, updates and configuration.

b. Exclusions:
   i. No exclusions.

c. Service Fees
   i. There is currently no fee for this service. The University reserves the privilege of determining whether fees would be appropriate in the future.

4. Standard application guest hosting services

Application guest hosting is the preferred means for accommodating an administrative application in the central data centers. Guest hosting relies upon a virtual infrastructures for storage, computation and network services.

a. The service includes (see enterprise equipment hosting service above plus these modifications):
   i. Design and installation coordination services for the guest host:
      1. NUIT staff will consult with the requester to
         a) Design the best fit of resources and operating system software for the application;
         b) Classify each guest host as either PROD, DEV or TEST, which will indicate how the guest host will be handled in a disaster or extraordinary maintenance activities.
            i. PROD (Production) – NUIT will work to sustain the guest host through a disaster or extraordinary maintenance activity. Failing that, the guest host will be a high priority to restore to service when that is possible.
            ii. DEV (Development) – NUIT will not attempt to preserve services through a disaster or extraordinary maintenance activity and may repurpose the equipment as part of a disaster recovery plan to restore PROD services. In the case of a service outage, restoration of DEV services is a low priority.
            iii. TEST – NUIT will not attempt to preserve services through a disaster or extraordinary maintenance activity and may repurpose the equipment as part of a disaster recovery plan to restore PROD services. In the case of a service outage, restoration of TEST services is the last priority.
      2. NUIT will assemble, configure and deliver computing and storage resources to establish the guest host for the application.
      3. If necessary, NUIT will assist with the migration of the application from existing equipment to the common computing and storage complex.
      4. If requested, NUIT will assist the application vendor with installation of the application onto the provisioned guest host(s).
      5. NUIT will evaluate and recommend options for high-availability and disaster recovery.

ii. Floor space and equipment racks – not applicable.
iii. Power – not applicable.
iv. Cooling – not applicable.
v. Network connectivity – not applicable.
vi. Network security – not applicable.
vii. Physical security – not applicable.
viii. Facility Maintenance – not applicable.
ix. Data backup
   1. Unchanged
   2. Not applicable.
x. Technical support for equipment administration – not applicable.
xi. Performance monitoring, capacity planning – not applicable.
xii. Software maintenance
   1. NUI will maintain all operating system and security software on the guest host, including licensing, updates and configuration.

b. Exclusions:
i. No exclusions.

c. Service Fees:
i. There is currently no fee for this service. The University reserves the privilege of determining whether fees would be appropriate in the future.

5. Enterprise application guest hosting services

Application guest hosting is the preferred means for accommodating an administrative application in the central data centers. Guest hosting relies upon a virtual infrastructure for storage, computation and network services.

a. The service includes (see standard guest hosting service above plus these modifications):
i. Design and installation coordination services for the guest host:
   1. NUI staff will consult with the requester to:
      a) Design the necessary resources and best operating system software for the application, taking into consideration the necessary continuity of service over equipment failures or maintenance.
      b) Classify each guest host as either PROD, DEV or TEST, which will indicate how the guest host will be handled in a disaster or extraordinary maintenance activities.
         i. PROD (Production) – NUI will include the application in its institutional disaster response architecture and operating plan, which emphasizes continuity of services despite disrupting events. In all cases, enterprise applications will be the highest priority to restore to service when that is possible.

6. Research equipment hosting services

The research equipment hosting services are very similar to the standard administrative service, but recognize a greater involvement by the research team in the administration the equipment. NUI is available to provide some assistance.

a. The service includes (see standard administrative equipment service above with modifications):
i. Design and installation coordination services:
   1. NUI staff will consult with the requester to:
      a) Unchanged
b) Unchanged  
c) Unchanged  
d) Not applicable
2. Not applicable  
3. NUIT will oversee equipment delivery and basic installation at the data center site.  
4. Not applicable  
5. Not applicable  
6. Not applicable
iv. Cooling  
1. All necessary cooling provided for designs of up to 15kW per rack. Any equipment requiring greater than 15kW per rack will be accommodated only on a separate construction agreement to add specialized power and cooling capacity.
v. Network connectivity  
2. Higher bandwidth requirements will be accommodated only on a separate construction agreement.
vii. Physical security  
1. Equipment is isolated in a research-only portion of the facility to which all research equipment owners have access.  
5. NUIT will permit access to the equipment by approved vendors upon notification from the equipment owner
x. Technical support for equipment administration – not applicable
xi. Performance monitoring, capacity planning, equipment refresh – not applicable
xii. Software maintenance – not applicable
b. Exclusions: (see “Standard administrative hosting service” – 1.b above)

7. Research application guest hosting services
The research guest hosting services are very similar to the standard guest hosting service. Guest hosting relies upon a virtual infrastructures for storage, computation and network services and may be a good fit for support of workgroups or Web-based applications with lower computational and network traffic requirements.

a. The service includes (see standard guest hosting service above plus these modifications):
   i. Design and installation coordination services for the guest host:  
      1. NUIT staff will consult with the requester to  
         a) Unchanged.  
         b) Not applicable.  
      2. Unchanged.  
      3. Unchanged.  
      4. Unchanged.  
      5. Not applicable.

8. Rights retained by NUIT
While an application or equipment is hosted within a central data center, NUIT retains the following rights to ensure the safe and efficient operation of the facility.

a. NUIT’s agreement to host physical equipment in a central data center is limited to the immediate request only and NUIT retains all administrative rights over rack space assigned to physical
equipment. Future interest by the equipment owner to expand or replace the original equipment will constitute a new request for hosting services. If approved, NUIT may fulfill such requests by (a) electing to assign a different rack space location to the application, and/or (b) requiring that the original equipment be relocated to a new location where free rack space can accommodate an application expansion. The cost of any equipment move, installation or re-installation costs are borne by the equipment owner.

b. NUIT may schedule maintenance of power, cooling and other environmental systems that will require the equipment or application to be shut off for periods of up to 24-hours. NUIT will attempt to give 10 days’ advanced notice of such maintenance; however, notice may be less in emergency situations.

c. NUIT may limit the amount of network capacity (bandwidth) available to the equipment or application if the observed use is excessive or is affecting other services of the data center.

d. At its own expense, NUIT may choose to relocate the equipment or guest host within the same data center to enable maintenance, or consolidate rack and floor space. NUIT will coordinate this work with the equipment or application owner and will ensure that the equipment or application functions identically after the move as before.

e. NUIT may provide, at its own expense, licensed software and require that software be installed and run on the equipment or guest host. The software will enable two-way communications between the equipment or guest host and NUIT monitoring and management systems with the intention of alerting the equipment or guest host of emergency conditions and prompting orderly shutdown.

f. NUIT may disconnect the equipment or application from the network without prior notice if, in NUIT’s opinion, it is malfunctioning, has been corrupted, is acting in a manner disruptive to other data center services, or is violating University policies or state or federal laws.

g. NUIT may remove power from any equipment without notice if that equipment, in NUIT’s opinion, poses an environmental, fire, overheating or other hazard to other equipment or to itself.

h. Annually, NUIT will audit the age and energy efficiency of equipment hosted in the central data centers. NUIT may notify owners when equipment is no longer maintainable, or when NUIT judges the equipment to be energy inefficient when compared to current models. These conditions usually occur in the fourth year of equipment life. The first notice from NUIT to the owner will require removal of the equipment within 12 months. Subsequent notices will be at 6 and 3 months. Final notice will require equipment removal within 30 days.

i. If an equipment owner is directed to remove equipment from the data center and fails to do so within the allotted time period, NUIT may remove the equipment to storage. If the equipment is in storage for longer than 90 days, NUIT may dispose of the equipment as it sees fit. NUIT will take appropriate protective measures for the equipment but will not be liable for any damage or failure resulting from storage or disposal.
## Definitions

| **“Administrative application”** | 1. Software that delivers administrative services to all or a portion of the University;  
2. Software that is funded through administrative divisions of the University for any purpose other than support of research. |
| **“Administrative equipment”** | 1. Computing equipment that delivers services or capacity to administration of the University;  
2. Computing equipment that is funded through administrative divisions of the University for any purpose other than support of research. |
| **“Backup” or “backing up”** | Securing and cataloging one or more copies of information in online storage services for use at a future time to recover that information in the case of a malfunction or error that destroys it. A “backup copy” of information is a secondary copy for recovery purposes. |
| **“Central data center”** | 1. A specialized facility operated for the University by the Information Technology Division (NUIT) to power, cool, sustain and secure computing, networking and information storage equipment;  
2. One of the following University locations:  
   a. Evanston Data Center,  
   b. Chicago Data Center & Network Facility,  
   c. Room LG87 in the Technological Institute. |
| **“Common computing and storage platform”** | An abstracted infrastructure of computing hardware, storage hardware, network services, and management software that can be assembled and dynamically adjusted to meet application needs. The flexibility of this infrastructure enables faster implementation of new applications and transparent use the University’s several data centers to increase capacity and address disaster recovery. |
| **“Enterprise system”** | A software service administered and used by a University business unit that either (a) is only delivery platform for an essential service, or (b) is a platform for a service to a very broad constituency spanning organizational boundaries. |
| **“Guest hosting”** | Providing suitable resources to support an application as one of several software programs sharing the common computing and storage platform. For an application owner, guest hosting is functionally identical to dedicated equipment. |
| **“Hosting”** | Providing suitable security, power, space, cooling and network connectivity so that an item of equipment can carry out its intended function. |
Service summary table

Key:  ✔ = Affirmative or NUIT  Opt = Owner has option to have NUIT perform
delivers/performs the function  the function
$$ = Owner is responsible for the cost  n/a = Not applicable to service
$0 = No cost
Blank cells: function is not provided by NUIT; Gray cells: function is not relevant to service

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Design and installation services

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Infrastructure

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<td>Information storage and backup</td>
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<td>Data backup</td>
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<tr>
<td>Central storage service backup by policy</td>
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<tr>
<td>OS, software backup for DR</td>
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<tr>
<td>Technical equipment administration</td>
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<tr>
<td>Employ monitoring system to assess health</td>
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<tr>
<td>Maintain equipment within standard practices</td>
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<tr>
<td>Notify equipment/application owner of problem</td>
<td>✔</td>
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<tr>
<td>Call for maintenance if under central contract</td>
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<tr>
<td>Software maintenance</td>
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<tr>
<td>Maintain OS, security software, patching, etc</td>
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<tr>
<td>RHE Linux</td>
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<tr>
<td>Windows server 2003 &amp; 2008</td>
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<td>Mac OS X server</td>
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<td>Solaris 10 &amp; 11</td>
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## Document revision record

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
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<tbody>
<tr>
<td>March 2011</td>
<td>Correct minor typographical errors. Additions to “Rights retained by NUIT” concerning</td>
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<tr>
<td></td>
<td>• annual audit of equipment age and energy efficiency, and</td>
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<td>• NUIT administrative control of rack space allocated to an application.</td>
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