Adequate Computer Hardware for Student Labs

A proposal submitted to the University Computation Advisory Committee
By
The Department of Agricultural and Biosystems Engineering
February 22, 2000

Proposed by

______________________________
James Shahan,
Project Leader

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Alan Kuutila,
System Support Specialist

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Stewart Melvin,
Head

With Support of

______________________________
ASAE Student Club

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AST Student Club

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AEGO Student Club

Project Leader
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II. Project Overview and Expected Benefit

A. Provide a description and intended purpose for all project expenditures and identify expenditures from Central Pool funds.

Background

The purpose of this proposal is to upgrade the hardware in the Agricultural and Biosystems Engineering (ABE) departmental open computer lab (125E Davidson Hall). This proposal addresses the following issues:

- Students need computer capacity beyond minimum / typical requirements.
- The computers currently in the open lab are not currently able to run the software that is being used by classes in the teaching lab (125D Davidson Hall). The computers are inadequate because they are too slow, not enough memory, and small hard-drives. A list of current software is located at the bottom of this page.

Several students have made requests to the department to upgrade the computers in the open lab. Formal requests have been made to the department head and appropriate committees. Letters of support are included in the appendices of this proposal. The students and their requests can be grouped into 3 categories:

- Undergraduate students working on Senior Design Projects
  - Large computer-aided-design (CAD) files from industry
  - Required to manipulate large amounts of data
- Undergraduate Student Club Activities
  - National Design Competition requires Computer-aided-design and analysis
- Graduate student classes / projects. A memo received from the graduate student organization is attached (see Appendix, A)
  - CAD modeling and analysis (Pro/E and Mechanica)
  - Manipulating large amounts of data

We currently have the software required; funding this proposal will allow all of our software to be available in both labs. This will make it significantly more available to the students. The software being utilized in the department is:

- CAD: AutoCAD, Mechanical Desktop, Pro/ENGINEER, Solidworks, IronCAD.
- Design / Analysis (FEA): Mechanica, CosmosWorks, STAAD/Pro
- Global Information Systems (GIS): ArcView, SSToolbox
- Other: Matlab, Visual Studio, Microsoft Office
- Utility Software: VirusScan, FTP, Telnet, e-mail, X-windows

The software currently used can be broken into categories that relate to determining the computer required:

- **High End**: CAD / GIS / Large databases
  - These applications require speed (RAM), and good video for rendering and visualization of the computer models being created.
- **Intermediate**: Somewhere between High End and Normal
  - Able to run all of the software, just not as fast as the high end.
- **Normal**: Report writing / General calculation Software
  - CAD: AutoCAD
  - Analysis: Microsoft Office (Excel), Matlab
The Proposal:

This proposal is requesting CAC central pool funds to acquire 16 computers. Computers that are sufficient enough to run software currently being used by students taking ABE courses. These computers will be placed in the departmental open lab facilities, replacing computers that no longer have the power required. The computers being replaced are 125MHz (8 computers) and 200 MHz (4 computers). All have limiting CPU speed, RAM, video, and hard disk capabilities. This proposal will add 4 computers to the open lab; they will occupy space where Project Vincent workstations had previously been located. Access to Project Vincent is now accomplished with X-Windows emulation on the other computers. We are proposing to acquire adequate computing power, not the most powerful on the market, just enough power to get the work done. To try to match student needs with an economical solution, we are proposing the following combination of machines.

- 4 workstations. Able to run high-end applications and able to handle larger projects.
- 6 Typical computers. Configured to run programs similar Microsoft office
- 6 Enhanced computers, upgraded to be able to handle the design / analysis software.

Specific configurations and costs are located with the budget (Section IV).

Issues addressed by this proposal:

- The newest, most powerful, computers will be placed where they are most available for student use.
- Four additional computers will be added to the labs.
- We will be providing a cost effective group of computers that meets the students needs.

Integration with existing facilities:

- The proposed computers will be added to the departmental NT server and network and be ready for Windows 2000. The students have disk space assigned on the server and can easily access their files on any computer in the labs.
- The computers will be placed in an existing lab. No remodeling is necessary.
- No new application software is being requested. Software and licenses are currently being taken into account at the departmental level.
- The computers will meet CAC requirements for connection to the campus network and have the required software.

B. Describe specifically how the proposed facilities or services will be made available to students.

1. Specify the hours when this facility or service will be available for general student use.

   The computers would be placed in a lab that is open as follows. Total is 75 hours / week during spring and fall semesters. The labs are open from 8:00-5:00 during breaks, not including University holidays.

   - Monday-Thursday: 8:00am – 10:00pm
   - Friday: 8:00am – 5:00pm
   - Saturday: 8:00am – 12:00noon
   - Sunday: 12:00noon – 10:00pm

   The departmental computer / teaching lab is also available during these hours, except when class is in session. The teaching lab was available as an open lab.
   - Fall 99: 53 hours per week.
   - Spring 00: 63 hours per week.
2. Identify the number of students that will able to work simultaneously during these hours.

125E (The open lab) has 16 computers.
125D (The teaching lab) has 21 computers.

3. Identify the student population(s) that should benefit from this proposal. Estimate the number of students served.

- The labs are the primary computer home for:
  1. Approximately 260 AE and AST undergraduate students.
  2. Approximately 50 ABE graduate students.
     a. Grad students are given keys to the labs, unlimited access.
     b. Most grad students do not have computers configured with the software and hardware being proposed here.

- The labs are also utilized and available for use by students from other departments that are taking courses in ABE or AST.

C. If the proposed project requires special new technologies, describe how these requirements will be met.

No new technologies, just keeping up with the demands of current Design/Analysis software. This is software that is currently being used by companies that hire our graduates and students as interns and co-ops.

D. Identify university facilities that would be needed for the proposed project. Specify the buildings and room number. A scaled sketch of the floor plan showing the location of the equipment should be appended.

The lab that will be receiving the machines is 125E Davidson Hall, the department's open computer lab.

III. Support and Maintenance

The department will continue paying for support and maintenance of this lab, same as previous years. Software is being covered by other funds (primary funding is from EFTF funds administered by the ABE):

- Departments share of University Licenses:
  - AutoDesk (AutoCAD, Mechanical Desktop, etc.) license fee $3900/year
  - Pro/ENGINEER / Mechanica, etc. $1000/year
  - MATLAB. Approximately $1000/year
  - Other Software: Microsoft Office, etc.
## IV. Budget

Table 1. Full Itemized Budget  
(Costs for the Entire Project)

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Central Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800MHz Workstation</td>
<td>4</td>
<td>$3,258</td>
<td>$13,032</td>
</tr>
<tr>
<td>500MHz Computers</td>
<td>6</td>
<td>$1,773</td>
<td>$10,638</td>
</tr>
<tr>
<td>500 MHz Computers, (Upgraded)</td>
<td>6</td>
<td>$2,308</td>
<td>$13,848</td>
</tr>
<tr>
<td><strong>Software Licenses</strong></td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>$37,518</td>
</tr>
</tbody>
</table>

### 800 MHz Workstation
1) 800 MHZ Pentium
2) 256MB RAM
3) 19” Color Monitor
4) 32MB Video Card
5) 20GB Hard Drive
6) CD-ROM
7) Ethernet Card
8) Desktop Case
9) 250MB ZIP drive
10) Windows 2000

### 500 MHz Computer
1) 500 MHZ Pentium
2) 128MB RAM
3) 17” Color Monitor
4) 16MB Video Card
5) 20GB Hard Drive
6) CD-ROM
7) Ethernet Card
8) Desktop Case
9) 250MB ZIP drive
10) Windows 2000

### 500 MHz Comp (Enhanced)
1) 500 MHZ Pentium
2) 128MB RAM
3) 19” Color Monitor
4) 32MB Video Card
5) 20GB Hard Drive
6) CD-ROM
7) Ethernet Card
8) Desktop Case
9) 250MB ZIP drive
10) Windows 2000
Table 2. Minimum Itemized Budget
(Costs for the Entire Project)

<table>
<thead>
<tr>
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<td>6</td>
<td>$2,308</td>
<td>$13,848</td>
</tr>
<tr>
<td>(Upgraded)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Software Licenses</strong></td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No new software</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>None</td>
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<tr>
<td><strong>Total</strong></td>
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<td></td>
<td>$24,486</td>
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</table>
Appendix A: Memo from Graduate Student Organization.

Date: 02/07/2000
To: James C. Shahan, 214A Davidson Hall
From: P. M. Boyd, AEGO Computer Representative

RE: Graduate Student Computer Needs

This memo discusses the general needs of graduate students for computer facilities as expressed to myself by graduate students in the ABE department. Much of the high end use of computers within this department is done by graduate students. In their research, high powered computing is required to operate complex diagnostic and estimation models for use in thesis and dissertation discussion. The currently available computer facilities are lacking primarily in high speed calculating ability. To be able to process data and run models in a reasonable amount of time, faster computers than are currently available are necessary. Ideally a number of new high speed workstations would be added to shorten the process time required to evaluate data.

To meet these demands, the graduate students in this department would like to see the installation of six workstations in Rm 125E with the ability to run all necessary software. As a minimum, processors should be of the Pentium III class (or AMD-K6-3) with a minimum of 600 MHz processor and 256 Mb of RAM. The key to high speed processing is not as much the top end listed processor speed but the RAM available to efficiently use this processor speed. If budgets predicate a downsizing of requests the primary key would be the available RAM. I feel that all students would be willing to handle a reduction in processor speed to 500 or 550 MHz to retain 256 Mb of RAM. For the public lab that these computers would be in, high end sound and video capabilities are not necessary. In addition to the workstation, we request that a scanner be added to the 125E lab because of limited access to the scanner in 125D during class times.

A consensus was made on the need for PC SAS on these new machines. With the elimination of Vincent workstations in the lab, access to SAS has become limited, and with this limited access has come limited knowledge of Vincent by graduate and undergraduate students alike. PC SAS is a much more user-friendly interface for students with limited Vincent experience. Ideally, PC SAS would only be available to graduate student with their login names. Although this would be the best, if it is necessary to make the software available to all, that would be conceded just to have the availability for graduate students. The following email excerpts were sent to me about the need for PC SAS on these workstations.

You had asked for creative and innovative ways to incorporate these computers. To be honest, I am at a complete loss on that, other than to say that the machines could be used for demonstration use in classes to show the newest high powered software as it becomes available.

There has been little consensus on other software that should be on these workstations among graduate students. That may have to be left to each student, with the ability for Alan K. to install necessary software in the future. To limit access to these machines while still keeping the lab public, it would be ideal to limit email access on these machines. Each will require MS office and the standard software. The ability for the addition of specialty software in future months would predicate fairly large hard drives. Adding software to the local drive on the workstation would eliminate the need for the software to run from the server. We request a minimum of 13.6 GB hard drives.

Let me know if you need anything more.

Thanks,
Paul M. Boyd
Appx. B: Letters of support from Student groups

To: jcshahan@iastate.edu
Subject: Computer Proposal
Date: Wed, 23 Feb 2000 08:07:51 CST
From: Elizabeth A Earles <eearles@iastate.edu>

Mr. Shahan,

After reviewing the proposal for computers for room 125E in Davidson Hall I feel that this would benefit AST students. We use the computers in this lab as well as 125D. Often they get used during the day when the teaching lab has a class. In the AST program we have a lot of classes with computer application associated to them. They range from web pages to ArcView, SST Toolbox, and AutoCAD. One class in particular, AST 281, uses computers extensively with AutoCAD and Mechanical Desktop. These files, when saved to disks and being worked with, take up a lot of disk space and memory often requiring the use of ZIP disks. The additional memory would also help when working with the computers so work isn't lost when the computers need to do a "memory dump".

The new computers with additional memory and capabilities will allow more students to work on projects at once. This would be especially evident when projects are due for classes. It would be beneficial for AST program and students.

Elizabeth Earles
AST Club President
Appx. B: Letters of support from Student groups

Date: 02/23/2000
To: James C. Shahan, 214A Davidson Hall
From: P. M. Boyd, AEGO Representative
RE: Graduate Student Computer Proposal Review

After reviewing the proposal to be submitted by the Agricultural and Biosystems Department, the Ag Engineering Graduate Organization has found that the proposed hardware additions to computing labs would sufficiently meet the current needs of graduate students within the department. The addition of high power workstations would allow for the integration of multiple pieces of data analysis software on the same desktop, saving time in file transfers and reducing data loss problems associated with having to run applications on multiple workstations. The proposed hardware would support all software necessary for data analysis in each research section in the department. Recently AEGO met to discuss the usability of the proposed labs and agreed by a unanimous vote that the implementation of this computer laboratory would satisfy their computing needs.

Paul M. Boyd
AEGO
Appx. B: Letters of support from Student groups

to: James shahan
from: scott wilcox
subject: agricultural and Biosystems engineering computer proposal
date: 3/3/00

After reviewing the proposal, I would like to express my support of the addition of larger capacity, higher speed computers to Room 125E in Davidson Hall. The addition of computers with the capabilities as described in the proposal would be beneficial to undergraduate agricultural engineers in many ways. First off, since Room 125E is an open lab, students would be able to access the computers at any time during the day. Currently, the computers most capable of running programs such as PRO/Engineer, Mechanical Desktop, and other software packages that require high speed, large memory computers are located in Room 125D. The problem is Room 125D is primarily reserved for teaching purposes throughout the week. There also seems to be a capacity problem due to the record number of undergraduates the department has in Ag Engineering as well as Ag Systems Technology. Next, the addition of these computers would allow the department to continue to be on the leading edge in terms of technology with the ability to use and teach the most up-to-date CAD and Data Acquisition packages. This will therefore allow graduating Iowa State Ag Engineers to remain top candidates in the job market.

Again, the Ag Engineering undergraduates and myself strongly support this proposal and look forward to the future benefits that these computers will bring.

Scott Wilcox
ISU ASAE President
Appx. B: Letters of support from Student groups

To: jcshahan@iastate.edu
Subject: CAC Proposal
Date: Thu, 24 Feb 2000 16:50:49 CST
From: Mike Brand <mbrand@iastate.edu>

I have read the computer proposal from the Ag and Biosystems Engineering Department, and I wish to express my approval of the proposal on behalf of the undergraduate ag engineering students.

This proposal will help ag engineering undergraduates by improving the quality of computers available to us. The current curriculum requires extensive use of computing capabilities. The uses include being able to manipulate data with programmed spreadsheets, programming with many various computer languages, and drafting projects and performing data analysis with high end CAD and GIS packages.

The computers currently available in the teaching lab are adequate to fulfill these needs, but the computers in the open lab are not up to par to perform these engineering tasks. Due to the number of hours that the teaching lab is unavailable during the day, it is sometimes difficult for students to complete the necessary coursework. For that reason, upgrading the computers in the open lab will greatly enhance the students’ abilities to perform their computing tasks, and it will greatly improve the overall computing resources available to ag engineering and AST students.

Mike Brand
Student Representative to Departmental Computer Committee