Allocations on the Web—Beyond Removable Tape

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ABSTRACT: OSC's allocations process, mandated by the Statewide Users Group (SUG), has become Web-based and automated. This process has moved disseminating allocations information from manual labor, with hard-copy forms and notes attached with removable to file folders, to data gathered electronically, processed automatically, made selectively available to committee members, linked to home pages of principal investigators and to proposal texts. The manual efforts helped all the staff involved focus on what information and what access were desirable, allowing the script developers to concentrate on format and procedure. OSC has now moved beyond removable tape to hyperlinks and committee-wide access to an impressive amount of information. For the future, OSC staff members hope to link the database, the repository of usage and allocations data, with the Web pages to automate processes even more.

Introduction

The Statewide Users Group's Allocations Committee oversees a peer-review grant process that allocates system resources to all academic users of the center. Peer review followed by panel review guarantees access by all qualified principal investigators and guarantees the center meets nationally recognized standards.

The Allocations Committee has its mission. Now we have to achieve it faster and more efficiently.

The challenge was before us. Use the World-Wide Web for the Allocations Committee. Get information to the members without letting the whole world see it. Speed up the peer-review process. Reduce paper and postage consumption. Improve the liaison's efficiency. Allow remote attendance to meetings.

Accepting the challenge was the first step in a gradual process to move from paper-based to Web-based grant application and award procedures. The transition is not complete, but the center has made good progress. More important, the progress has been smooth.

Let's look at the center, the Allocations Committee, the old procedure, the Web-based adaptations, and then the future of Web-based allocations. Planning, testing, and gradual implementation, plus the experience of creating the center's technical Web pages, have been keys to the growing acceptance by users. The great enthusiasm and abilities of the technical pages Web master and her assistant programmer are two more keys.

The World-Wide Web's contributions to disseminating information are diverse and extensive. People use the Web for purposes ranging from creating their own homepages to searching the world for an obscure fact. OSC is taking advantage of another use of the Web—to create pages for the use of a busy committee whose members come from all over the state. The Web is convenient for this purpose because the committee members can have access to the information while restricting access by other people (to maintain confidentiality of reviewers, for example), the liaison can update information immediately, and various parts of the pages are interactive. The allocations process has been an OSC responsibility for the 11 years the center has existed. Now OSC technical staff members are applying those experiences toward developing a Web-based system to streamline procedures and meetings. The new system is already faster, more flexible, and less labor intensive than the methods it is replacing.

What Is the Ohio Supercomputer Center

The Ohio Supercomputer Center (OSC) [1], in Columbus, Ohio, is a state-supported resource that serves Ohio's higher education community. OSC offers computing resources on a peer-review basis to faculty and students conducting research in several disciplines including business, chemistry, engineering, mathematics, medicine, and physics.

As part of its mission, OSC provides a high performance networking, computing, and information technology infrastructure for a diverse, statewide/regional community including education, government, and industry. The scientists and engineers who use the OSC find interaction in the research community to be central for the advancement of computational methods within and between disciplines.

To ensure a productive environment for research, an active Statewide Users Group (SUG) provides the director with program and policy advice. SUG meets bimonthly and is headed by a chairperson elected from the SUG membership. The SUG has established Allocations, Software and Activities, and Hardware and Operations standing committees to assist in providing advice and direction to the center.

The center is overwhelmingly an SGI/Cray shop. Our three major computing platforms are the Cray T94 [2], the Cray T3E [3], and the SGI Origin 2000 [4]. Our file server is a Cray J90. Our classroom contains an array of Silicon Graphics Indy workstations. Specifically, OSC's major hardware [5] consists of

Cray T94 The Cray T94 computer system at the Ohio Supercomputer Center is a powerful, general-purpose supercomputer that features 4 high-speed (450 MHz) processors, each with a peak performance of approximately 2 billion floating point operations per second (2 GFLOPS).

Processor
Technology: Custom silicon 50,000 gate array circuits
Number of processors: 4
Vector pipes: 2 per processor
Peak performance: 8 GFLOPS

Memory
Technology: 4 Mbit static RAM
Memory size: 128 Mwords (1024 Mbytes)
Maximum memory bandwidth: More than 100 Gbytes/sec

I/O
Attached Disks: 100 Gbytes (DD-301 and DD-302)
Communication interfaces:
    TCP/IP network to graphics devices and OARnet
    HIPPI Interface
    Interface

Cray T3E The Cray T3E computer system is a powerful scalable parallel system with 128 processing elements (expandable to 512).

Peak performance: 76.8 GFLOPS
Architecture: Multiple instruction multiple data (MIMD) with hardware support for single instruction multiple data (SIMD) processing

Processing Elements (PEs)
Microprocessor: DECchip 21164 64-bit super-scalar RISC
Four-way instruction issue with two floating-point operations per clock
32-bit and 64-bit IEEE floating-point arithmetic
On-chip 8 Kbyte direct-mapped L1 instruction cache
On-chip 8 Kbyte direct-mapped L1 data cache
On-chip 96 Kbyte three-way-set-associative L2 unified cache
Number of PEs: 128
Local memory per PE: 16 Mwords (128 Mbytes)
Data error protection: 300 MHz
Peak performance per PE: 600 MFLOPS
Peak memory bandwidth: 1.2 Gbytes/sec

Memory
Technology: 16 Mbit DRAM
Architecture: shared, physically distributed, globally addressable
Total system memory: 16 Gbytes

Interconnect network
Topology: 3-D torus
Interprocessor communication rate: 480 Mbytes/sec in each direction

I/O
Number of GigaRing connections: 3
Peak I/O bandwidth: 1 Gbyte/sec per GigaRing channel
Attached disks: 200 Gbytes
Communication interfaces: TCP/IP network to graphics devices and OARnet
HIPPI interface
FDDI interface

SGI Origin 2000 The Silicon Graphics Origin 2000 is a shared memory multiprocessor system consisting of 24 250-MHz IP27 processors and 3 GB of main memory. Each processor has a MIPS R10000 CPU and a MIPS R10010 floating point unit. The current operating system is IRIX 6.5 Applications form other SGI architectures can be easily ported to the Origin 2000.

Operating System: IRIX 6.5
3 gigabytes of main memory
24 250-MHz IP27 processors
    MIPS R10000 CPU
    MIPS R10010 FPU
    64 KB on-chip data cache
    4 MB off-chip unified data/instruction

cache

The Allocations Committee

As noted in the last section, the Allocations Committee directs OSC's grant process. This committee has been the largest and most active of SUG's committees during the decade of the center's existence. Meeting bimonthly, the committee often has an extensive agenda that includes new proposals, pending proposals, review duties, and discussion items of concern to the user community. Three large file cabinets and numerous archive cartons contain the hard copies of records and information of a decade of allocating resources. Paper has been an important expense for the committee and significant storage problem for the center.

The Allocations Procedure as It Was

Before the Web-based allocations procedure could be created, OSC staff needed to describe in detail what information the committee needed and what steps the liaison took from receiving a grant application and proposal to installing the award.

How complicated can an allocations procedure be? After all, no money is involved, so budgets are unnecessary. Ideally, the committee receives an application form, discusses it, awards the request, installs the accounts, and gets on with its life. Real life has twists and turns that complicate matters. The reality of OSC's grant application process includes different levels of grant requests, justification of size of request, demonstration of performance optimization, a review process, e-mail discussion among the members, a lengthy meeting every two months, multiple copies of grant proposals needed for the reviewers, multiple copies of all information for committee members, special requests for additional information from the principal investigators, and various platforms from which to choose.

Moving a multiple-step, branched activity like OSC's resource allocation to the Web must be implemented in phases to help users (committee members and applicants) adapt to the new system and to allow the developers to plan each step. The Web is well suited to such modular development. OSC is now moving from paper-based application procedures and meetings to on-line systems with information available to Allocations Committee members as soon as the liaison receives it. Plans include direct links between the Web information

and OSC's database and virtual attendance for members who cannot drive to Columbus for a meeting.

The old process demands the following steps. The liaison receives a grant application and proposal, plus supplementary materials. For start-up and classroom requests for ten or fewer resource units (RU, roughly equal to one clock hour of computing time on the Cray T94), she needs only one copy of the proposal. For standard grants (11-100 RUs), major requests (101-2000 RUs), and special requests (2001 and more RUs), she needs five copies of the proposal. Most of the time she receives five copies; when she doesn't, she makes copies as needed.

Using a simple template for e-mail, the liaison acknowledges receiving the grant application.

Dear [name]:

We have received your proposal, "[title]".

We have begun the review process. We have notified the members of the peer panel, the Allocations Committee of the OSC Statewide Users Group, that we have received the proposal, the proposal is being mailed to peer reviewers, and we are entering the application information in the OSC database.

We are taking all possible steps to expedite the review process. It is the most time-sensitive portion of the grant award.

The review process comprises two steps. The first step is to mail copies of your proposal for peer review. Reviews are due back within 10 days. The second step is panel review during the bimonthly Allocations Committee meeting. The next committee meeting will be Tuesday, [date]. We will notify you as soon as possible after the committee makes an award decision.

Thank you for your interest in the resources of the Ohio Supercomputer Center. Please let me know if I can be of any assistance.

Using another e-mail template, she keys in most of the information from the grant application form to send to the Allocations committee, the center's

science group, and the center's external relations group.

To the Allocations Committee

We received the following proposal at the OSC [date].

PI: [PI name]
        [PI title and department]
        [PI institution]
        [PI Web address]
Title: [proposal title]
NSF Fields of Science Classification:
 [type]   [RUs requested]
Other Sources of Support:
        [sources]
Summary: [abstract]
Machine(s) Requested:
Software: [software]
Authorized Secondary User(s):   [secondary investigators' names and titles]

Then she installs the initial 10-RU award in the database (everyone who applies receives 10 RUs; the committee meets to decide whether to award the balance). To make the 10-RU award, she adds new users, creates a new project or adds to an existing project, adds the resource units to the project, and adds new machine accounts as necessary. The next step is the review process. The liaison identifies three to four reviewers: one or two from the principal investigator's suggested list, two to three from other experts we call on for reviews. She writes the reviewers' names on a form, on which she also notes the date the review packets are mailed.

Reviewer Routing Slip

Principal Investigator:

Title:

RUs requested:

Sent to:
                                              Date

She prepares a packet containing a merge letter, a form with the requested due date of the review, a summary sheet produced by the database, the review guidelines and form (also a merge document), and

the proposal itself. Occasionally, when we want more than four reviews, the liaison makes the additional copies of the proposal. She mails out the review packets. She staples copies of the PI summary sheet and review request letters to the reviewer list. If too few reviews come in, the liaison identifies more reviewers (noting names and mailing dates on the reviewer list), prepares more packets, and mails them.

When the request is for a standard allocation, the committee is able to make the decision by e-mail, on the basis of a single positive review. The procedure has evolved such that appropriate committee members can be the sole reviewers for this level of request. They can also review larger requests, but two to four reviewers are necessary for major and special requests.

The committee decides about pending major and special requests only during the bimonthly meetings. The SUG chair is a nonvoting member, as is the committee chair. Sometimes the committee's decision is to make the award pending some response of the PI—more information, more detailed justification, a reprint. After the PI satisfies the conditions, the committee chair authorizes installing the award.

The committee meetings last about two hours. The week before the meeting, the liaison mails out meeting packets, containing an agenda, minutes of the previous meeting, copies of the application forms (not the entire proposals), and any supplementary materials. Timing is a consideration; the information the committee members receive stops at the time the packets are sealed and mailed. At the meeting, extra packets are available to members if necessary. (After the meeting, the liaison conscientiously recycles extra paper.)

Before the meeting begins, the liaison prepares the proposal folders. She attaches a quarter-page form (below) to the folder with removable tape.

PI: _____
Project # _____
RUs requested _____
RUs received _____
RU balance _____
# of Reviews _____
        Positive _____
        Negative _____
Comments _____
Committee Action _____

On this form she lists the PI, the project number, the project balance, the number of RUs requested, the number of RUs awarded to date, the number of reviews received, and a breakdown between positive and negative reviews. The form has spaces for comments and committee action. Inside the folder she arranges the papers with reviews on top, then the reviewer list stapled to the summary sheet and review request letters, the proposal, and then the supplementary material. She carries all of the pending folders to the meeting, in agenda order.

Once at the meeting, the chair reads the information from the form taped to the front of the folder, then reads aloud the reviews one by one. Sometimes an appropriate committee member contributes an on-the-spot review, so the committee can close out a proposal. Committee members come from all over Ohio; sometimes attendance is difficult, and the committee misses the input of the absentee members.

During the meeting, the liaison takes notes and manages the folder traffic; much paper is passed around. After the meeting she enters the awards in the database, sends e-mail messages for the PIs to explain the awards, request additional information, and convey portions of reviews. Then she transcribes the minutes of the meeting. And begins the process again with incoming proposals.

Allocations Procedures on the World-Wide Web

The enthusiasm of the chairperson and the members of the Allocations Committee has been an important incentive for the transition to World-Wide Web procedures. We haven't quite achieved chat rooms with icons representing the attendees. But we have made good progress in a relatively short time. We know the system to date works and speeds up the process. We have conducted allocations meetings with the on-line information on an overhead screen. One of the latest meetings made up a cancelled meeting. We used the Web-based information and a conference call to the members. Only one member was actually at OSC. The committee accomplished a significant amount of work in good time.

Eventually, we will require on-line submissions, but at present we are accommodating different skills of our users. Until on-line grant application forms are required from PIs, if the liaison receives a hard-copy grant application form, she keys in the on-line form for the PI and submits it. She then continues the new Web-based procedure.

The liaison still uses the simple template to acknowledge receipt of the proposal. Then the liaison forwards the e-mail with the grant application form and proposal, if provided, to the Allocations Committee, the science group, and the external relations group. Then the liaison goes to the appropriate directory and creates a subdirectory, using the PI's last name and the submission date as the title (name.99MMDD). After she changes the permissions for the subdirectory, she exports the grant application form from her e-mail inbox to the subdirectory, giving the file the title form.txt. She edits the file by placing square brackets around the abstract, proposal text, publications, and resume. Then she creates another file entitled review.list. In this file she supplies reviewer information to be used for creating links to review from the pending projects site. After changing the permissions on these files she runs her first automated Perl script. This script creates several files: abstract.html; comments.html; form.html; pending.list; review.html; sizeofrequest.html. The file form.html is the interactive form for reviewers. The script installs the information and creates the links to the sections of the new proposal. To keep the instructions to one screen, the programmer created a separate file to explain the size of request for those reviewers who do not know how OSC's resource accounting works. The first Perl script creates the link and the file automatically. The file "pending.list" distills the information needed for the pending page of the Web site. The form.html file, based on the form.txt, becomes the link for the review form. The comments.html file creates a pop-up screen from the pending page. Comments are collected there, and committee members can add new comments. The file abstract.html is a preparatory step for moving the pending proposal to the directory entitled current. We want to limit the amount of information available in this Web site, so only the PI's name and affiliation, the proposal title, and abstract are accessible.

After running the script, the liaison moves up a directory level and runs four more, brief scripts. The fourth script prompts her to enter information, if necessary. Through this last script, the liaison can have the program move pending proposals to the archive and current directories if appropriate.

Now that the liaison has received an electronic grant application form (either directly from the PI or created from the hard-copy application form), forwarded it to the allocations announcement alias, created the directory, exported the application form to the directory, created the review.list, run the four scripts, she is ready to notify the reviewers. She has a simple e-mail template that requires only the

addition of the directory name for that proposal (PI name and date received).

   Good morning!

   The Ohio Supercomputer Center would appreciate your evaluation of a request for OSC services. The review instructions and form are on the Web at

   http://www.osc.edu/[URL]/review.html

   You will see the links to the proposal sections when you access the review form.

   If you are able to review this request, please provide your comments and recommendations on the Web form and press the "submit" button when you are finished. Your response will, of course, remain strictly confidential.

   Thank you for your assistance. We would appreciate your response within the next ten days. Should you have any questions concerning this letter or the evaluation process, please feel free to call the Ohio Supercomputer Center at (614)292-xxxx.

She can send this request to any number of potential reviewers, thus ensuring she will receive enough reviews for the committee meeting. The reviewers save postage and can respond immediately. It helps the liaison to know, for example, that a reviewer does not intend to submit a review for whatever reason; she will note the response and will not send that potential reviewer a reminder. One reviewer commented that the review request marked his first electronic proposal/review process, and he was pleased with the results.

Once the liaison receives the review form, she forwards it to the Allocations Committee, removing the reviewer's name and address. She deletes the reviewer information because the committee members are also users, and we promise our reviewers that their comments will remain confidential. The liaison then exports the review to the PI's directory, one review to a file. Then she moves up to the grant directory where the four scripts reside and updates the Web pages. The Allocations Committee Web page now shows that a review is available; the script automatically reads the recommendation and creates the link with the recommendation shown. Committee members

readily see what sort of reviews a proposal has received.

We discovered one change we want to make in the above procedure, however. The review procedure can be extremely speedy. In one instance, the liaison received a proposal, mailed the review requests, and received a review the same day. Because the proposal was for a 100-RU request, the positive review permitted the Allocations Committee chair to authorize awarding the full request. The liaison installed the award, ran the scripts and archived the proposal. Archiving the proposal removes the review form. The tradition is that the reviewers have ten days to respond. We will change the scripts to allow the review form to remain active even after the proposal has been archived. Additional reviews can bring valuable information for PIs, even after the award has been made. Furthermore, if reviewers try to reach a URL and get error messages, they may be discouraged from submitting reviews in the future.

The current projects and the archived projects directories are similar; the archived projects directory has more information than does the current directory. The archived projects section contains information for the committee members. This section is like the actual hard-copy files we maintain in that it contains links to the proposal, the reviews, and the comments.

Allocations Meetings on the World-Wide Web

Less automated yet valuable is the information for the bimonthly meetings. This section collects the agendas and minutes for the meetings, latest meeting at the top. An html document contains the format; the liaison copies the earlier file and keys in the appropriate information for the upcoming meeting. The minutes are linked from the agenda. The agenda items link to the pending projects section; from there, committee members can follow the links to the proposals. This section eliminates the need to send out packets. In addition, if committee members decide to review grant proposals, they can easily move from the agenda to the proposal.

In the first meeting at which we used Web-based information, committee members who attended watched an overhead projector connected to a workstation showing the Web pages. We also had some members who could not attend. They called in to the center's speaker telephone on a conference call and used their own workstations to gain access to the Allocations Committee's Web pages. The

meeting worked well. However, the liaison and her supervisor had to attend (instead of just the liaison) because the liaison had to handle the files, while the supervisor moved to the appropriate links on the Web pages. Too many proposals were still in hard copy form. During the second meeting, we determined that at least one voting member of the committee had to attend in person, because we still depend upon paper files for some projects, and the voting member had the responsibility to look at the hard-copy information. During the third meeting (the most recent), we used the center's teaching facility so each attendee had access to a workstation. Most of the information was on line, so the liaison did not need to pass around the hard copies. During that meeting, the chair was unable to attend in person, but she called in on the speaker telephone and was able to refer to the Web pages on her home workstation and chair the meeting.

Reactions and Future Directions

The advantages to the Web-based allocations system have already become apparent. Processing applications is faster. The review process is streamlined. Users, including committee members, OSC staff members, principal investigators, and reviewers, have generally reacted positively to the new system. There is no doubt that users will become more adept at moving around the Allocations Committee Web site as time goes by. Every meeting has brought new developments from the evolving system, but everyone has been adapting well.

As liaison to the Allocations Committee, I have positive feelings about the new procedures. The learning process is an investment for future time saving. I am so enthusiastic about the on-line review procedures that I have been typing in proposals that had been submitted in hard copy. I have to type in the application form at any rate, so the text is just an additional task. When I get a review in hard copy, I also type that information in and submit it to myself. However, even when the proposal is a hard copy, and I have to send out review packets by regular mail, I use the Web review form created by the Perl script for the use of the reviewers. In the cover letter, I also give the URL for the on-line Web form and encourage the reviewer to use that rather than the hard-copy formThe more information we have on line and the more consistent that information is, the more accustomed to the new procedures everyone will become.

OSC's database is more than ten years old. The management and the systems people have decided it

is time for a change. This change will affect the Web procedures we now have, certainly in a positive way. We plan to have direct input from the database to the Web pages. The overriding considerations preventing our having the current Web pages tap directly into the current database include the fact that our database systems person was committed to working on the new database. He could not invest time working on a system based on a soon-to-be-obsolete program. The current database has restricted access and change authorization and is a complicated program, so my supervisor could not tap into it on her own. On the other hand, last summer my supervisor had the directive from the Allocations Committee to have the Web pages ready to go by the November 1998 meeting. She worked with the resources we had, coming from the direction of what information we knew the committee wanted and how to get it from the material we received from our PIs. Our database systems person, my supervisor, and the assistant programmer are working to ensure that the new database will streamline the allocations work. Another new feature will be automated letters notifying and reminding PIs that their projects have negative balances. The negative balance list coming from the database will issue e-mail to the PIs and possibly secondary investigators yet allow me to alter the messages, if necessary.

Knowing the Allocations Committee members and knowing my supervisor, her assistant programmer, and our database systems person, I am fully confident that more innovations and work enhancements will be forthcoming. Our experiences have been positive; the transition has been smooth; the investment of time, effort, and planning has been worthwhile.

References

[1] http://www.osc.edu/glimpse/index.html (link to mission statement)

[2] http://www.sgi.com/t90/

[3] http://www.sgi.com/t3e

[4] http://www.sgi.com/origin/2000/

[5] http://oscinfo.osc.edu/hardware