December 2003

Predicting Grid Computing Software Adoption: An Exploratory Study

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Abstract

The advent of preemptive, multitasking, multiprocessing personal computer operating systems for such as Windows 2000/XP, Mac OS X, and Linux provides an opportunity for more efficient resource allocation. For processing in particular, the recovery and reallocation "idle" cycles on personal computers normally wasted on screensavers could potentially be harnessed for computationally intensive projects. Using networked PCs and specialized software applications to capture these idle cycles, a virtual supercomputer can be created at a fraction of the cost of an actual supercomputer. A number of organizations have launched such grid computing projects including Ford and Chrysler (impact analyses/auto design), Pratt & Whitney (engine design), and Monsanto (genetically altered food development) using the power of their internal PCs.

The widespread use of Internet-capable personal computers has provided opportunities for constructing extremely powerful "public" virtual computers using the combined computers of businesses and individuals. For example, the Search for ExtraTerrestrial Intelligence (SETI) project uses a grid so that each user can analyze a small portion of radio telescopic data for signs of non-chance signal patterns suggestive of intelligent life. United Devices along with Oxford University and the National Foundation for Cancer Research have initiated a drug screening program for cancer research. Despite the promise of these programs, participation has been relatively low.

Based on a risk perspective, the present research describes a test of three factors that could potentially improve adoption by lowering risk perceptions. A scenario approach was used in which a single computer description was modified to differ only in terms of how the grid computing software was acquired (acquisition method) and how the software was updated (maintenance method). Six scenarios were created to describe the possible combinations of the two manipulated factors– three levels of acquisition methods (preinstalled, included with a bundled CD, or downloadable from a Web site specified in bundled documentation) and two levels of maintenance methods (automated software updates via the Internet and software updates via download from a Web site specified in bundled documentation). A third risk reliever was tested by measuring the perceptions of how easily the software could be removed if necessary.

The data were analyzed using analysis of covariance (ANCOVA) with acquisition method, maintenance method, and gender as fixed factors and familiarity and uninstall perceptions entered as covariates (N=64). Results show that the perceptions of the uninstall process were significantly related to adoption intentions ($F=6.27$; $p<0.05$). That is, the less difficulty anticipated in the process of removing the grid software, the more likely the person is to try the program. There was also a significant main effect for the acquisition method ($F=3.45$; $p<.05$). Post hoc comparisons indicated that preinstallation did differ significantly from the downloading option ($p=0.017$) but not with the accompanying CD option ($p=0.863$). None of the interactions were significant.

These data suggest that for relatively hands-off applications such as grid computing software, the traditional interpretation of ease of use should be expanded to include the entire software lifecycle. The fact that both manipulated and perceived risk relievers were important in the adoption decision reinforce conclusions reached in the services literature-efforts to increase adoption rates should be managed using both operations management (to address actual risks) and perceptions management (to address perceived risks). Additional research is needed to assess other risk reliever methods.