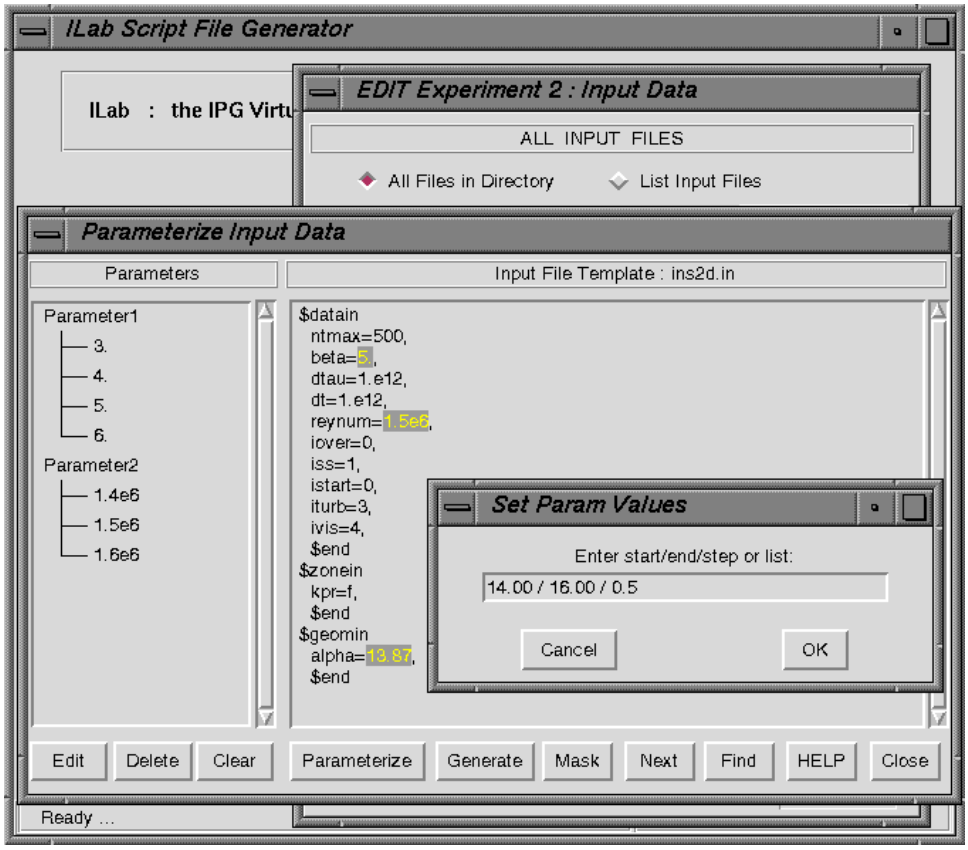
ILab: An Advanced User Interface Approach for Complex Parameter Study Process Specification and Submission

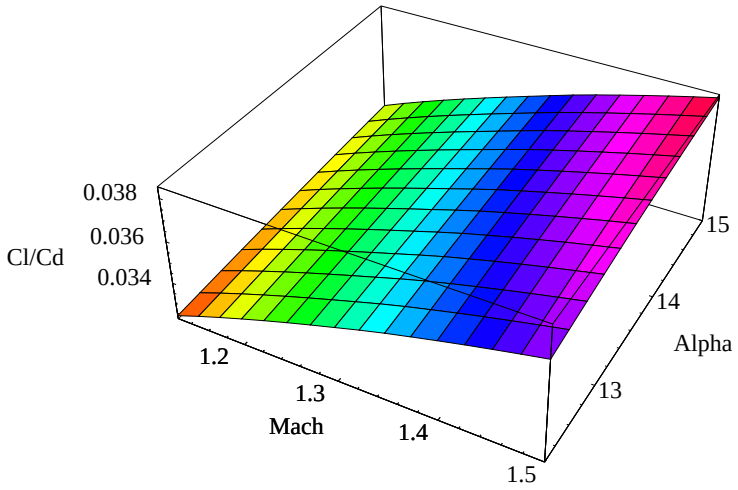
Parameter study creation and submission has been fully automated with this GUI-based tool. In addition, the greatest impediment to user acceptance of the IPG/Globus model has been overcome: the job control language, which is required for submitting into the IPG/Globus processing environment, has been eliminated. Our GUI tool first automates the creation of parameter studies of arbitrary dimension and then automatically creates all Globus job control language (RSL decks and auxiliary shell scripts) required to actually set up and invoke Globus jobs on the IPG. The tool can also submit jobs onto local or remote systems independently of the Globus middleware.



ILab parameterization screen

In order to minimize the difficulty of creating a parameter study, we have constructed within ILab an integrated, special-purpose text editor. This editor, in fact, has unusual editing capabilities: it functions exclusively to allow the *graphical* selection of the appropriate parameter data fields and allows the user to designate the set of values for each of the candidate parameterized fields. Because the file parameterizer is integrated within the ILab GUI, and because its use is intuitive, the process of parameterization of input files has been made near trivial.

Job submission for the parameter study has also been automated. Jobs migrate to appropriate compute resources selected by the user. Once there, these processes build a directory structure, import all necessary input files, and then run to completion.



Coefficient of lift over drag for the X38 CRV

We have demonstrated the ILab capabilities by creating a 12 by 16 case parameter study in Mach number and Alpha (angle of attack) for the X38 Crew Return Vehicle. These 192 flow solution cases were automatically submitted, using Globus, onto two separate Origin2000 parallel machines. Each of these 128-grid 4-processor jobs was simulated with the Overflow-D2 code. At SuperComputing'99, the ILab tool created parameter studies and submitted the resulting flow solution problems without once failing (a non-trivial feat for a live network-based demo at the SuperComputing conference).

In the near future, we will be making our alpha release to CAS application users. We have assembled a group of interested users who have parameter study needs. We have completed a Technical Report describing the ILab project (NAS TR NAS-00-009), and will also be writing a user manual. We are currently building a CAD-based complex process specification capability (visual scripting). This will allow users to visually construct process specifications for processes of arbitrary complexity, ultimately including feedback loops, restart capability, and multi-stage parameterization.

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