COMPUTER AIDED PROGRAMMING FOR SIMULATION (CAPS) TUTORIAL

Dr. G. K. Hutchinson
University of Wisconsin-Milwaukee

There are many potential application areas where simulation could profitably be used and isn't. Two of the main factors that limit the use of simulation are the long lead times necessary to develop checkout models and the limited number of people who can program simulations. Dr. A. T. Clementson of the University of Birmingham early recognized the commonality of these problems with the more general problem of design and noted the success of computer aided design (CAD). Using the established principles of CAD, he developed CAPS, which is the subject of the tutorial.

CAPS carries on an interactive dialog with the user, who needs no programming experience, to assist him in defining his model. When the process is complete, usually within an hour for interesting models, CAPS writes the simulation code, which is guaranteed to be logically consistent and to execute on first submittal. Thus, in a time span measured in minutes rather than months, the user has a model output to assist him in his decision process, without the assistance of a programmer.

CAPS is based upon activity cycles as the basis of both systems analysis and simulation. Briefly: Activity cycles center on the resources of a system rather than the events which take place, the processes involved, or the flows through the system. If one follows any resource through time, conceptually there are alternating states of activity and idleness (either of which may be of zero duration). Some activities will appear in the cycles of more than one resource, these are cooperative activities. In order for an activity to start, all of the necessary resources must be in their respective immediate predecessor idle states. The complete activity cycle diagram portrays all conflicts for resources, and is an extremely useful means of communications. In addition, it is the basis for CAPS simulations.

Activity cycles are logically appealing and easy to grasp. Once they are understood, the CAPS dialogs become trivial, merely following CAPS' prompts. MBA's with an introductory Fortran course as background go on to a terminal with 4 hours of lecture and some do models of rather complex systems. Experienced analysts should be able to use CAPS after the tutorial (if a line into UWCC is available, you'll have an opportunity).

The tutorial will consist of an explanation of activity cycles, an illustrative problem, the CAPS dialog, and the output from the simulation.

CAPS operates on my computer with an ASCII Fortran IV compiler, backing store, and a 16K 16 bit minimum core. At the University of Wisconsin, the costs of operation are usually dominated by connect time.

SIMSCRIPT II.5 TUTORIAL

Dr. E. C. Russell
C.A.C.I., Inc.

Two modelling concepts - processes and resources - have been added to the SIMSCRIPT II.5 "world-view." From a conceptualization viewpoint, it is sometimes convenient to view a system as a collection of processes. A process may be thought of as a sequence of related events separated by lapses of time, either predetermined or indefinite. Indefinite delays may be caused when conditions do not permit the process to proceed. (Example: competition among processes for limited resources is a cause of indefinite delays.)

These two modelling concepts have several advantages. For a large class of systems (particularly complex computer systems - both hardware and software), they provide a much more natural framework for modelling. Because they are more natural, they are more teachable, and can be related more readily to real objects and systems. Therefore the amount of program needed to model a system is significantly reduced, and the logic of the model is more readily apparent to the user.

This tutorial is intended to give an overview of modelling and programming in SIMSCRIPT II.5. Selected case studies will be used to illustrate the use of SIMSCRIPT's fundamental "building blocks," first in formulating a model and then putting it in machine-readable form. The emphasis is on concepts.