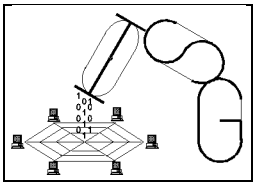
BSSE System and Software Engineering



ISG

Instantaneous System and Software Generation

A Process Model and a Toolset for Automated Production of Software

ISG significantly reduces the amount of software to be written manually by introducing automation over the complete lifecycle. Accordingly, costs, development time and risks decrease. E.g. the infrastructure for real-time processing or communication is automatically generated from names and figures provided by the system engineer. Also, specific application software can be and has been generated on the same high level of abstraction.

ISG automatically converts system engineering inputs into an executable system without human intervention. It provides shelves into which other software fragments can be plugged-in by drawers.

With ISG an engineer can concentrate on system engineering matters only and does not have to care about details of software implementation, still having the opportunity for tuning and configuration according to the project's needs. A system engineer can generate a complex and executable software system without support of a software expert.

ISG checks whether the inputs are consistent and complete, generates what is needed for compilation and execution, instruments the code for later analysis of the system's properties, coordinates network-wide the generation of executables within a heterogeneous network possibly consisting of different platforms, starts and monitors execution, collects and evaluates the results, and provides textual reports and tools for graphical display of the executed scenario.

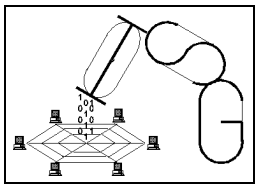
ISG automatically stimulates the system by legal or illegal inputs and generates CPU load and data traffic.

ISG analyses the code coverage, provides a large variety of figures on resource consumption, informs on occurence of exceptions, injected faults and about violation of properties.

Specific extension of ISG is possible on request. ISG can also cover the areas of e.g. databases, GUIs.

Key Features:

Human Interface:	The system information may be provided by a tailored environment which a user prefers or is already using. It may be obtained from documents, spreadsheets, UML-based notations or other notations a user is familiar with. Default format: spreadsheet
Distribution:	Automated and transparent distribution, easily configurable by high level directives. The generated system can be executed on any number of physical processors between one and the maximum number of allocated processors without any need to change inputs other than definition of the nodes. Automated set-up of the processor network and harmonisation of time.
Real-Time Processing:	Asynchronous processing of data and events, generation of sporadic or cyclic events, creation of timeouts, monitoring of deadlines, timeouts and resource consumption
Message Exchange:	Messages as defined by the user, support of any user-defined data formats and data conversion
Status and Mode Control:	Based on Finite State Machines, mandatory exception handling
Maintenance Support:	Capability for easy and inexpensive re-structuring without loosing user-provided code, support of incremental development, prototyping of the system-under-development without wasting of effort
Stimulation:	Messages, automated generation of CPU load and data traffic
Fault Injection:	Loss of data, generation of illegal messages, stimulation of dormant states time jitter on timed events (one-shots or periodic events, various time jitter modes)
Fault Tolerance:	Support of redundant processors and communication channels
Verification&Validation:	checks at pre-run-time, run-time and post-run-time checking of logical and performance properties
Reporting:	reports on logical and performance properties, exceptions and injected faults according to the instrumentation selected by the user, presentation of data flow and events in a MSC-compatible format and versus time, additional reports on request
Generation Platforms:	PC: Linux other platforms on request	Sparc: Solaris
Target Platforms:	PC: Linux, VxWorks other platforms on request	Sparc: Solaris,VxWorks



Sample Results:

The following figure 1 shows the data flow (MSC) and figure 2 events vs. time. Such figures are immediately available (10 .. 20 minutes depending on the system's complexity and the generation platform (reference: PC-800-MHz)) after provision of engineering inputs. Various filtering modes are supported. In case of timing diagrams processes, instances and messages, indication of data flow direction and destination may be coloured.

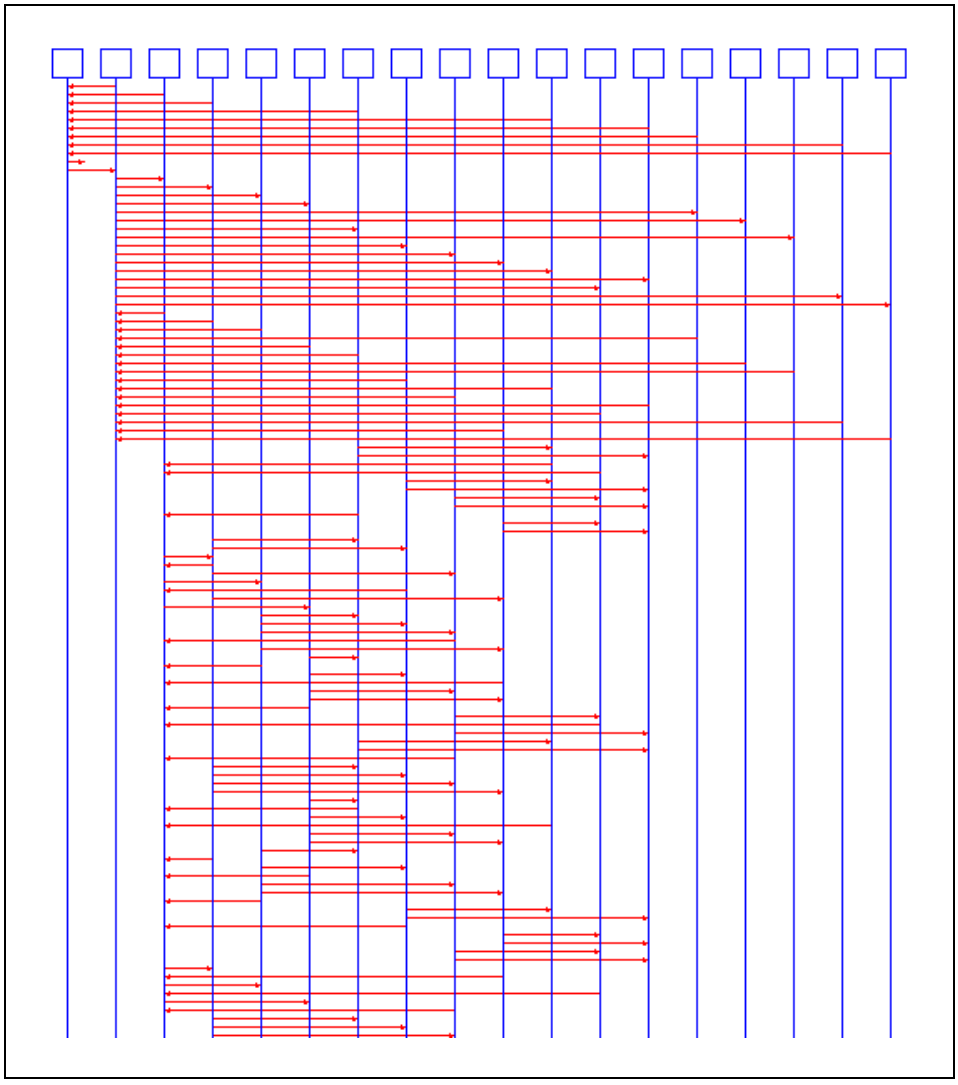


Fig. 1: MSC Data Flow (Message Sequence Charts)

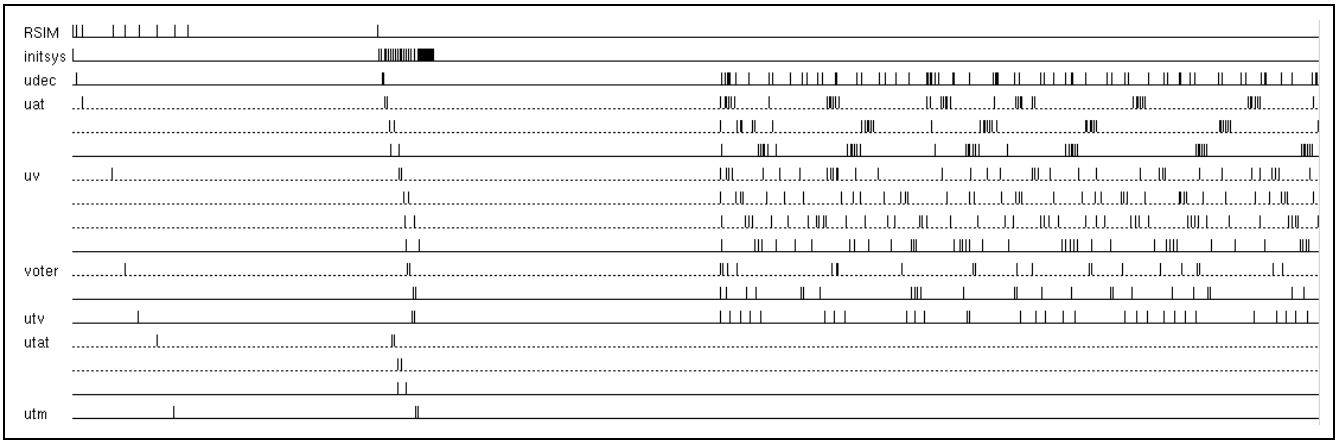


Fig. 2: Timing Events