ITRON Newsletter No.8

ITRON Technical Committee, TRON Association
Katsuta Building 5F, 3-39, Mita 1-chome, Minato-ku, Tokyo 108, JAPAN
TEL: (03) 3454-3191 FAX: (03) 3454-3224

Online Distribution of μITRON3.0 Specification Begins

The English-language version of the μITRON3.0 Specification is now available online via the Internet. The earlier μITRON Specification (Ver. 2.01.00.00) and ITRON2 Specification (Ver. 2.02.00.10) have been distributed by this means for some time, but with the completion recently of the μITRON3.0 Specification in English, this latest version is now being made available as well.

The specifications may be downloaded via the Internet from the directory TRON/ITRON/SPEC in the machine utsun.s.u-tokyo.ac.jp (IP address: 133.11.11.11), using "anonymous ftp." The method is explained below. An alternative method is to use a gopher, in which case the server is acrux.is.s.u-tokyo.ac.jp (IP address: 133.11.14.5).

Consideration is also being made to distributing these files on a floppy disk, if there is a demand for this service. Those interested should contact the TRON Association. Free distribution of ITRON specifications applies only to the English-language editions, since the Japanese editions are sold commercially in bookstores.

How to use anonymous ftp:

After connecting with the Internet, enter the following command (this example applies to UNIX).

```
% ftp utsun.s.u-tokyo.ac.jp
```

If you get an "unknown host" or similar response, use the IP address `133.11.11.11` instead of `utsun.s.u-tokyo.ac.jp`. The following message should appear on your screen after you connect successfully.

```
Connected to utsun.s.u-tokyo.ac.jp.
220- utsun FTP server (Version 6.4....
220 Welcome to utsun.s.u-tokyo.ac.jp....
Name (utsun.s.u-tokyo.ac.jp:  hiro):
```

For the `Name`, enter "`anonymous`," and for `Password` enter your E-mail address. Then proceed as follows.

```
ftp> cd TRON/ITRON/SPEC
ftp> dir
```

Here a list of available file names will be displayed. Enter the file name as follows.

```
ftp> get [file name]
```

The designated file will then be downloaded to your machine. For more details on using ftp, refer to the manual for your particular computer model under ftp command.

ITRON-related Publications

Listed in another page are the publications prepared and issued by the ITRON Technical Committee as of April 1, 1994. The ITRON-μITRON Standard Handbook is a one-volume compilation of μITRON (Ver 2.0) and ITRON2 specifications. Each of the publications can be obtained directly from the sources indicated.

The latest version of μITRON3.0 is now Ver 3.01.00. Changes made since the μITRON3.0 Standard Handbook was released (Ver 3.00.00) are noted in Newsletter No.5.

The ITRON Standard Guidebook '92-'93 still applies to users of μITRON (Ver 2.0) and ITRON2 specifications, even though the dates in its title are now past. When a new edition of the ITRON Standard Guidebook is issued it will be targeted primarily at the μITRON3.0 specification.

ITRON Q&A

A selection of questions received by the ITRON Technical Committee that are of general interest to users are taken up below.

Q. When `sus_tsk` is issued for a running task from an interrupt handler, we should expect the state of that task to be changed from Run to Suspend; yet in the state transition diagram on p.23 of the

† This newsletter is reprinted from TRONWARE vol.27 and TRON PROJECT BIMONTHLY No.32.

ITRON-related Publications

Name	Type	Price	Publisher	ISBN No.
ITRON-μITRON Standard Handbook	Specification (Japanese)	4,800Yen	Personal Media Co.	4-89362-079-7
μITRON3.0 Standard Handbook	Specification (Japanese)	4,000Yen	Personal Media Co.	4-89362-106-8
ITRON/FILE Standard Handbook	Specification (Japanese)	3,000Yen	Personal Media Co.	4-89362-092-4
ITRON Standard Guidebook '92-'93	Textbook (Japanese)	3,500Yen	Personal Media Co.	4-89362-197-6
μITRON Specification Ver 2.01.00.00	Specification (English)	12,000Yen	TRON Association	–
ITRON2 Specification Ver 2.02.00.10	Specification (English)	15,000Yen	TRON Association	–
μITRON3.0 Specification Ver 3.00.00	Specification (English)	–	TRON Association	–

NOTES:
- Prices do not include consumption tax.
- The documents issued by the TRON Association are available to Association members at a special discount rate.

μITRON3.0 Standard Handbook (Japanese) no such state transition is indicated.

A. The diagram to which the question refers simply shows the most typical state transitions. It is quite possible that other transitions will occur in particular implementations. The transition occurring when `sus_tsk` is issued for a running task from a task-independent part is an example of a state transition not shown in the diagram.

There are other examples as well. When `ter_tsk` is issued for a running task, in some implementations the task will go from Run to Dormant state (when an exit handler is implemented, direct transition to Dormant state is not an ironclad rule); but this transition is not shown.

Because of cases like these, a footnote should be added to the state transition diagram explaining that only the most typical transitions are indicated; and in fact this is being planned for the next edition.

Q. Is there a standard methodology or benchmark test for evaluating the performance of an ITRON-specification OS? Can you suggest any reference material on the subject of ITRON performance evaluation?

A. The ITRON Technical Committee has not made available any standard methodology or benchmark test for ITRON-specification OS performance evaluation. A major reason is the large difference in performance requirements of an embedded-system OS depending on the application, making it very difficult to express performance by a uniform measure.

Much of the documentation provided by manufacturers for their ITRON-specification OS products uses task switching time and maximum interrupt latency as indicators of run-time performance. It needs to be noted, however, that the definition of task switching time may differ from one manufacturer to another.

The following papers have been presented on the subject of ITRON performance evaluation.

1) H. Monden et al., "A Proposal on ITRON Evaluation," Proceedings of Third TRON Realtime OS Research Panel (IEICE, Oct. 1987), pp.2-5. [in Japanese]

2) K. Nakata et al., "Performance Evaluation of MR7700," Proc. of TRON Technical Studies Conference, Vol.2, No.1 (1989), pp.31-40. [in Japanese]

Free Software

The software introduced below is not sold commercially, so it is not registered with the TRON Association in the ITRON-related product registration service. Instead, it can be obtained free of charge.

Anyone wishing to have their ITRON-related free software introduced in a future Newsletter should contact the ITRON Technical Committee. The committee is now thinking about changing the product registration service to allow the inclusion of free software.

ItIs

Sakamura Laboratory
Faculty of Science, Univ. of Tokyo

ItIs (ITRON Implementation by Sakamura Lab) is a real-time kernel developed for research and educational uses, and conforming to the ITRON specifications. The present version, called ItIs Phase3, implements the μITRON3.0 Specification.

Outline of ItIs

ItIs implements the μITRON3.0 Specification for TRON-specification microprocessors. The current version implements all the μITRON3.0-specification

functions through Level E, as well as all Level X functions. It also has a number of original extended functions, and connection function support is planned for the future.

The target systems presently supported include Personal Media Corporation's MCUBE (Gmicro/300), the Gmicro SBC (single-board computer) system (Gmicro/200 and Gmicro/300) offered by the Gmicro Group manufacturers, and Aval Data Corporation's TVME-150 CPU board (Gmicro/200). It is designed to be ported easily to other target systems based on TRON-specification microprocessors.

ItIs Features

ItIs has the following features.

- Emphasizes ease of extension and maintenance

  Inasmuch as the main reason for developing ItIs is for educational and research uses, the implementation allows for ready extension or alteration.

- Supports two system call interfaces

  Both the software interrupt and subroutine calling methods of invoking system functions can be used in the same system.

- Provides original extended functions

  Original functions are provided for automatic ID assignment and for debugging support, etc.

- Geared to the TRON-specification CHIP architecture

  Full advantage is taken of features in the CHIP architecture specific to ITRON.

- Designed for flexible reconfiguration

  ItIs is provided as source code, enabling it to be configured as needed.

- Free software

  In addition to ItIs itself, the necessary development environment and tools are available as free software.

Distribution and use

The beta version of ItIs based on the μITRON3.0 Specification is being distributed free of charge in Japan. In addition to its use for research purposes in the Sakamura Laboratory, it is being used as course material in the SIGBTRON course offered by Personal Media Corporation, as an aid in understanding the ITRON-specification OS design.

The intention is to have ItIs used as widely as possible so that it can be further improved in the process. It should also serve as a useful reference for people who are considering their own independent ITRON development. Anyone interested in obtaining the ItIs source code is encouraged to contact the Sakamura Laboratory in University of Tokyo Faculty of Science.

Recent Works on ITRON

The Proceedings of the TRON Technical Studies Conference, Vol.6 No.1, includes two papers on research relating to ITRON. The first is on "A Test Data Generator for an ITRON-specification OS," by T. Takeuchi et al. of University of Tokyo. The second paper describes the "Development of an ITRON-specification Real-time OS Simulator on MS-DOS," and is by N. Kishi et al. of Musashi Institute of Technology.

Two papers on ITRON are likewise included in the proceedings of RTP'94, the 1994 Real-time Processing Workshop, which is Vol.93, No.516 of the IEICE Reports. One is by H. Takada et al. of University of Tokyo, on "Adaptability and Standardization in the μITRON Specification," which introduces the approach taken in the μITRON specification design to reconciling the demands for standardization and flexible adaptation to applications and hardware. The other paper is on "The Evaluation of Silicon TRON Design," by T. Nakano (Toyota College of Technology) et al. It discusses the effort to realize the basic μITRON-specification functions as a hardware kernel.