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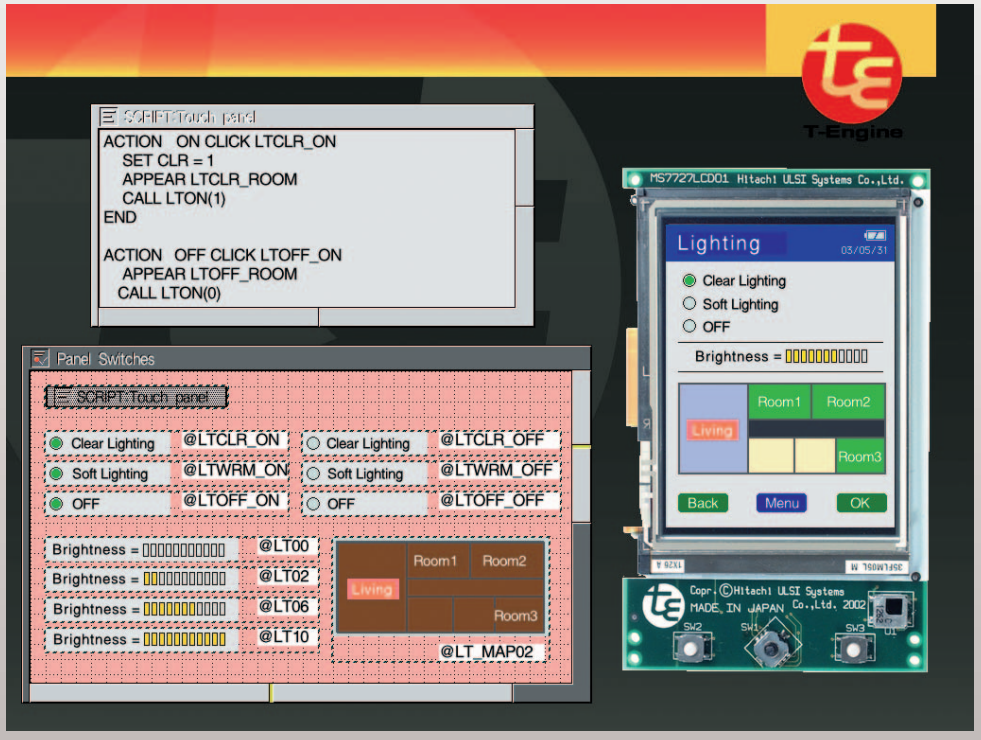
Multilingual GUI & Network Middleware Set for T-Engine

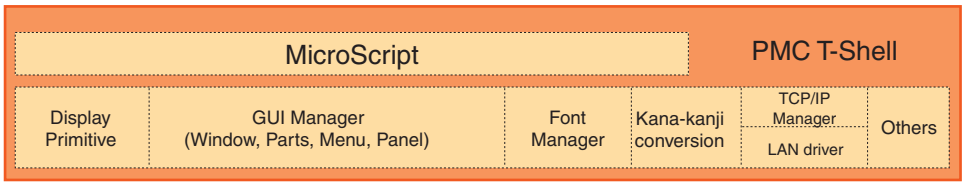
PMC T-Shell

T-Engine



PMC T-Shell

"PMC T-Shell" is a multilingual GUI & network middleware set for T-Engine. It fully supports functions for embedded systems using network and/or display. Its font manager supports 180,000 multilingual characters, and it is especially powerful in system development for Japanese/Chinese/Korean languages including huge character sets.
Combining this middleware set, you can efficiently develop your applications. We can also offer "T-Engine total solutions", such as tuning for your system, combining multimedia middleware, support/developing applications such as internet browser, and so on. "PMC T-Shell Development Kit" is suitable for evaluating PMC T-Shell.



PMC T-Shell middleware components

● GUI Functions

GUI functions are to manage screen display, from primitive drawing such as line, circle and characters, to high-level window system. They are categorized mainly in 3 levels. You can remove unnecessary components by your level choice.

◯ Primitive Drawing Level (Display Primitive) (*1)

This level is for primitive drawing, such as setting drawing environment, clipping, figure drawing (line, circle etc.), bitmap image operations, character/string drawing and pointer operations.

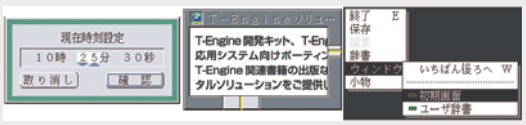
* Font manager (*2) and font data are required to draw characters/strings.

◯ Window level (GUI Manager)

This level is for windows system, equivalent to that on PC. It is supported by GUI manager, which consists of the following managers.

* This level requires the primitive drawing level.

- Window manager
  for multi-window
- Menu manager
  for pop-up menu
- Parts manager
  for GUI switches, volumes (scroll bar) etc.
- Panel manager
  for interactive dialog panels such as user setting
- Tray manager
- Data manager
- Text input primitive



high-level GUI supported by GUI manager of PMC T-Shell

◯ BTRON System Level (Real/virtual Object Manager)

BTRON system level supports network-type file management ("real/virtual objects").

* This level requires the primitive drawing level and the window level.

● Multilingual functions

Multilingual functions support 150 million characters at maximum, defined by JIS, Unicode and other huge character sets, including their font management.

Characters available in PMC T-Shell standard package

◯ Font Manager (*2)

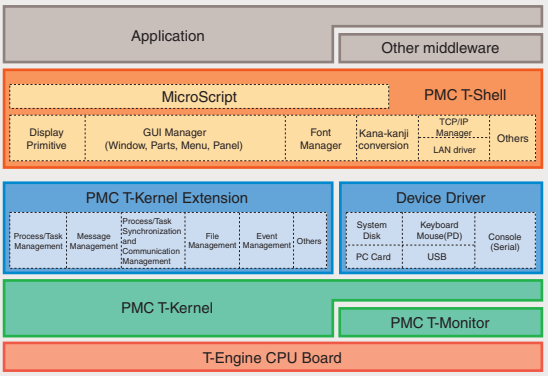
Multilingual TrueType fonts contain more than 180,000 characters in total. Compact-size dot fonts are also available. The most appropriate font is selected automatically by the specified font size. You can also specify font styles such as Ming and Gothic. If the specified font style does not exist, the most similar font style is selected. Font manager is called by character drawing functions of the display primitive (*1).

◯ Kana-Kanji conversion

Kana-Kanji conversion is to input in Japanese. The conversion engine is VJE, and it supports multi-clause conversion, learning, user dictionaries and so on. It also supports huge character sets; if you register characters for personal names such as "吉", "髙" and "﨑" with their pronunciation, you can input these characters by Kana-Kanji conversion.

● Network functions

The standard T-Engine specification does not contain network functions. PMC T-Shell contains TCP/IP and LAN driver, which are not included in the T-Engine Development Kit.



○ TCP/IP Manager

It is an IPv4 TCP/IP protocol stack based on socket I/F, including client-side functions of ICMP, ARP, DNS, DHCP and PPP.

○ LAN driver

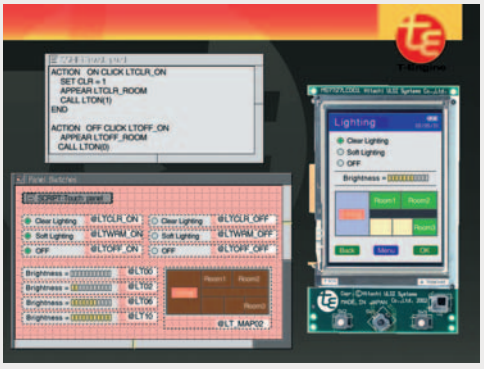
LAN driver works with the TCP/IP manager. It supports not only extension LAN board for T-Engine, but also some wired/wireless LAN cards in PCMCIA slot of standard T-Engine.

● µScript

"µScript (Micro Script)" is a visual-oriented language. It works also on BTRON/Chokanji. PMC T-Shell contains this µScript, and it is suitable for prototype development of HMI (Human Machine Interface) and many applications such as games, simulations, electronic books, slide show and demonstration.

In µScript, you can define figures and image data (including photo) as named segments to put on screen, and then you can put and move these segments by your script. You can also define actions to events such as mouse click on segments by easy scripting. Using µScript you can develop software without any knowledge about T-Kernel, T-Kernel Extension and C language. Moreover, changing and debugging your script are much easier than C language development.

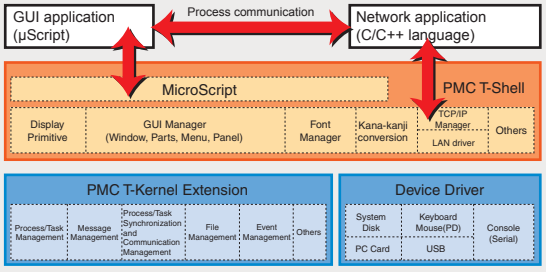
µScript is a compiler-interpreter language, which uses CPU-independent intermediate code (virtual machine code) on execution. Therefore µScript programs are CPU-independent and executable on T-Engine of any other CPU or Chokanji PC. Recompiling is not needed. You can develop, test and evaluate your HMI software on Chokanji PC even before making your target hardware. This achieves both short development cycle and high quality software. Moreover you can design and develop your HMI software efficiently on a wide PC screen.



GUI parts of light control written in µScript

○ Collaborate with C/C++ language

µScript can collaborate with C/C++ language. For instance, in case of applications using both GUI and wireless LAN, you can write your GUI script in µScript and write your network program in C/C++ language. This method achieves both short development cycle and high execution performance.



Collaboration between C/C++ and µScript

○ µScript Functions

Screen Functions	Input and Output Functions	Control Functions
Appear, disappear, move & copy segments / appear with effects / set string / set font & color / appear system message panel / move & resize window / put compressed image (BMP, PNG, JPEG)	Input mouse & key event / input kana-kanji conversion / serial port access / parallel port output / file access / message output / device driver access / refer global name data / raise event / beep / refer current time	Create & delete threads / function call & return / conditional jump & wait / iteration

● Miscellany

PMC T-Shell Development Kit also contains data land editor application, tool box such as user setup, system setup, kana-kanji conversion setup, calculator, clock and touch panel adjuster, tiny ping / ftp / telnet tools, and network test tools.

Applications covered by PMC T-Shell

- **Embedded systems with high-level GUI**
  Audio & visual devices, office machines, vending machines, KIOSK terminals etc.
- **Embedded applications based on huge character sets**
  Electronic books and dictionaries, public office terminals
- **Network applications**
  Contents browser, set-top boxes
- **Prototype development**
  Constructing prototypes in short time by "µScript"

Reference Books and Related Information

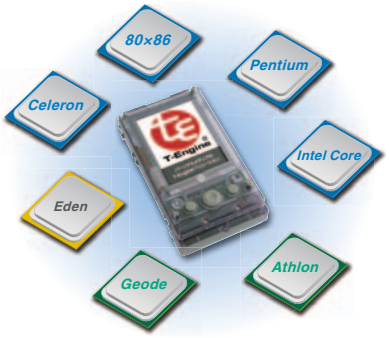
- T-Kernel Kumikomi Programing Kyokasho
  (A Practical Guide to T-Kernel Embedded Programing), Ken Sakamura (Ed.), 4200yen.
- T-Kernel Standard Handbook, Ken Sakamura (Ed.), 3800yen.
  * English documents are included as PDF files on CD-ROM.
- T-Engine, T-Engine2, T-Engine3 (TRONWARE extra edition), 1600yen (each).
- TRONWARE Vol.1-109 (TRON bimonthly magazine, scheduled to be continued), 1200yen (ordinary issue).
- µITRON 4.0 Standard Guidebook, Ken Sakamura (Ed.), 3200yen.
  * The above books are published by Personal Media Corporation in Japanese. Tax is not included.
- T-Engine Forum http://www.t-engine.org/
- TRON Project http://www.tron.org/
- Personal Media Corporation (T-Engine Solution Website)
  http://www.t-engine4u.com/en/index.html

T-Engine Appliance

Teaboard2/ARM920-MX1

Teacube/VR5701 Evaluation Kit

T-Kernel/x86 Development Kit



Product Makeup

Software

Target-side software

- Display primitives
  Basic screen drawing functions are provided, including those for configuring the drawing environment, clipping, drawing lines, arcs and other figures, performing bitmap operations, pointer manipulation, and others.
- Font manager
- Font server
  Draws characters and strings. TrueType fonts are also supported.
- Window manager
- Menu manager
- GUI parts manager
- Panel manager
- Tray manager
- Data manager
- Text input primitives
  Realizes a window system.
- Real/virtual object manager
  Realizes a network-shaped file management model.
- Kana-kanji conversion server
- Kana-kanji conversion dictionary
  Employing VJE-Delta Ver. 2.5 as the conversion engine, it provides kanji conversion functionality supporting a rich kanji environment.
- LAN driver
  LAN drivers supporting a PCMCIA LAN Card(*1) and the Expansion LAN Board are included.
  (*1) Supports NE2000-compatible cards and some other LAN cards. Contact PMC for details about supported models.
- TCP/IP manager
  A LAN driver, including expansion LAN support, and an IPv4-compliant TCP/IP protocol stack based on the BSD socket interface are provided.
- Font data (Dot/TrueType)
  TrueType fonts with more than 180,000 characters, or dot fonts alone where size is of importance, can be provided to match the application.
- MicroScript
  A compiler/interpreter visual language ideal for creating HMI-related programs and test suites. Programs created in MicroScript will run on Chokanji and on any T-Engine board, without the need for recompiling.
- Other utilities
  Also included are: data land editor application, utilities for user configuration, system configuration, and kana-kanji conversion settings, a calculator, clock, touch panel adjustment utility, tiny ping / ftp / telnet tools, and network testing tools.

Host-side software

- PMC T-Shell development environment
  A T-Shell development environment added on to the T-Engine development environment.
- Chokanji V
  The Chokanji V system running on IBM PC/AT compatible machines. Among its uses are for making various system configuration settings and for MicroScript program development.

Product documentation

- PMC T-Shell Development Kit Manual
  Describes the Development Kit contents and explains operations.
- PMC T-Shell Manual
  Describes the PMC T-Shell API.
- PMC T-Shell Programming Guide
  Describes the introduction to T-Shell Programming.

Product Lineup

PMC T-Shell/SH7727 Development Kit
PMC T-Shell/SH7751R Development Kit
PMC T-Shell/SH7760 Development Kit
PMC T-Shell/VR5701 Development Kit
PMC T-Shell/VR5500 Development Kit
PMC T-Shell/TX4956 Development Kit
PMC T-Shell/ARM926-MB8 Development Kit
PMC T-Shell/ARM922-LH7 Development Kit
PMC T-Shell/ARM920-MX1 Development Kit
PMC T-Shell/ARM720-LH7 Development Kit
PMC T-Shell/ARM926-MX21 Development Kit
PMC T-Shell/PPC-V4FX Development Kit

* The PMC T-Shell Development Kit is a software package for use in developing evaluation and prototype programs running on each of the T-Engine Development Kit products. In addition, PMC T-Shell is licensed to system vendors for end product use. License agreements are drawn up separately based on the number of units and necessary functions. Please contact PMC for details.

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