A CHINESE CHARACTER TEXT EDITOR FOR EMBEDDED SYSTEM EDUCATION

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ABSTRACT

A course project experiment plays a awfully vital role in mastering a student embedded system computer code education. The paper offers the look and implementation answer to a Chinese character text editor for embedded system (CCTE for short), together with demand analysis, perform style, task division, main method flow, Chinese character method, man-machine interface layout and check results. This course project may be used as a guide for embedded system computer code experiment.

I. FOREWORD

One vital side of associate degree embedded system (ES for short) education is that the course project experiment. It needs the scholars to create a product epitome with some style conception in an exceedingly research lab, that is between verification experiment at school and business project at scale and technology level [1]. however the present scenario in China is that a lot of school students lack enough data concerning development within the IT business. this example is very worse for metal students. although they need studied several courses within the institute, it's still a puzzle for them to create a course project. If the teacher and also the assistant of metal course have ready many course project prototypes before, it's convenient for them to assist students to quickly get acquainted with metal computer code development and swimmingly complete the assigned course comes. this sort of epitome examples ought to possess characteristic of wide relevancy and adequate development scale. Out of this thought, we tend to developed associate degree metal Chinese character text editor (CCTE for short), that may be a teaching course project utilized in our metal course teaching. CCTE may be thought of a course project experiment paradigm embedded within the computer code development curricula for master students. it's a text editor utility supported VxWorks software and numerous metal experiment board, capable of American Standard Code for Information Interchange text written material and Chinese character text written material. during this paper, we tend to introduce style and implementation of CCTE.
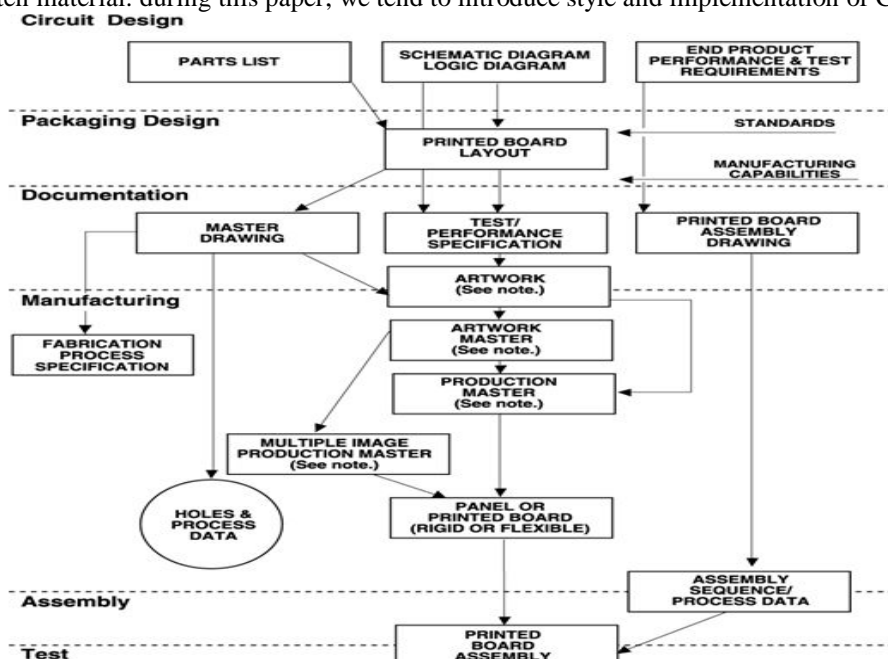

Fig:-1 IPC flow chart for the main 7 tasks of CCTE

II. ASSEMBLE DEVELOPMENT ATMOSPHERE

More typically than not, the event of associate degree embedded system is accomplished in an exceedingly cross development atmosphere, that is, the code is written and compiled on the host machine, whereas the workable image program are going to be running on the target machine. In our experiment, the host machine may be a laptop running Windows XP and also the integrated development atmosphere is Tornado a pair of.2 given by Wind watercourse Corporation. The software on the target machine is VxWorks. as a result of CCTE can have operations on files, we tend to established the DOS classification system within the nonvolatile storage. The interface between VxWorks and nonvolatile storage is TrueFFS (Tffs for short) block device, that isn't a classification system itself and so entails the employment of DOS classification system.

III. DEMAND ANALYSIS

We analyzed some documents of a superior text editor with graphic interface, that runs within the real metal atmosphere [2][3]. once the analysis, we tend to thought of that associate degree metal editor ought to have the subsequent basic functions [4].
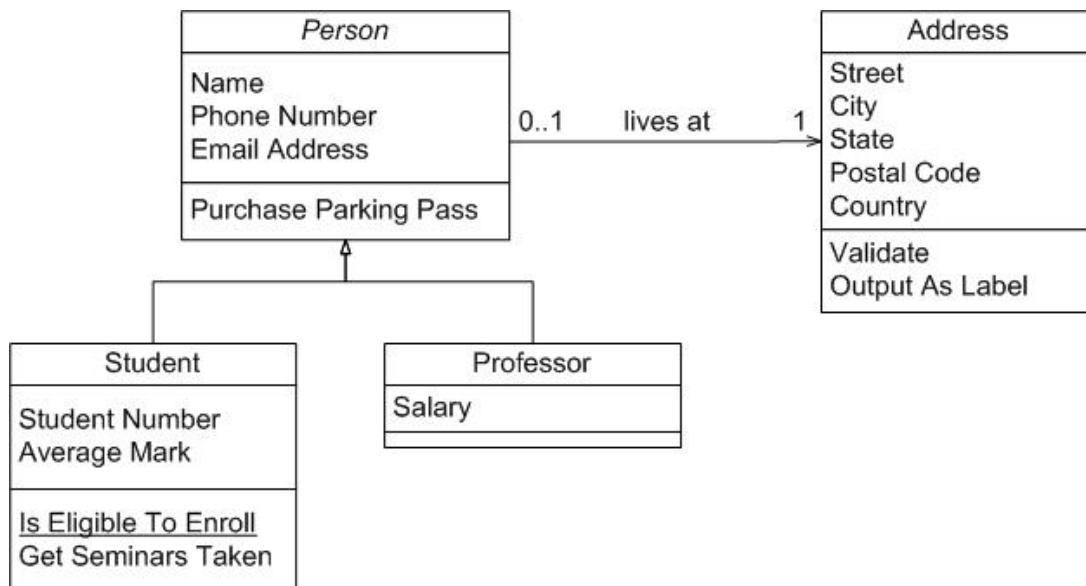

Figure 2. UML class diagram

file in nonvolatile storage, and also the characters in file may be well showed on written material window in pages and features sequence at liquid crystal display screen of ARM9 processor experiment board; (5) Page down and page up display function; (6) notice a particular string in text and highlight it. (7) By pressing keys on tiny keyboard, user will move focus pointer to in operation location in computer file. (8) It will insert or delete associate degree ASCII character or a Chinese character at the pointer location.

IV. TASK DIVISION

The embedded text editor is split into seven tasks. careful data of these tasks ar given as follows:

Entry task: this is often the entry perform of CCTE. it's conjointly the most control operation of the editor. The task foremost initializes international variables and arrays, second creates some semaphores and message queues. Then the task attracts frame of Man-Machine Interface (MMI for short) on liquid crystal display, gets emended computer file name, builds up some fonts for text drawing, sets up Pinyin search tree for Chinese character input. After that, it creates half dozen tasks. Finally it enters associate degree infinite loop. within the infinite loop, it calls perform task— input ( ) {to do|to try to to|to try associate degreed do} an input job. That perform waits to receive slightly screen input or keyboard input. Once input is received, it sends corresponding message to connected task.

Text space task: This task is chargeable for text's content show. CCTE displays such contents as American Standard Code for Information Interchange variety, American Standard Code for Information Interchange image, American

Standard Code for Information Interchange letters, and Chinese characters. At the start stage, it opens a computer file from nonvolatile storage, reading all information and loading them into memory. Then it sets up index for the text pages and calculates total pagination. After that, it displays the primary page content in written material window of CCTE. it's continually in an exceedingly waiting state. If this task received messages from alternative tasks, together with pointer moving, content inserting, content deleting, content appending, page up or page down displaying, file saving, etc., it processes them quickly consistent with concrete content of received message.

Num space task: Main perform of this task is to retort to message trigged by variety input buttons. It extracts American Standard Code for Information Interchange code from the message that is shipped from Entry, and sends them to Text space task, which can insert the American Standard Code for Information Interchange code into pointer place and show the text page together with that code.

Eng space task: This task responds to message trigged by English input buttons. It processes message sent from Entry, and extracts American Standard Code for Information Interchange letter code. Then this task sends American Standard Code for Information Interchange code to Text space task, which can insert and show the code.

It responds to message trigged by Chinese character input buttons. It processes Chinese phonetic code messages sent from tEntry, finishing Chinese character letter code search and input through phonetic retrieval perform. Then this task sends Chinese character GB2312 code to tTextArea task, which can insert and show that Chinese character at current pointer place. tSymArea task: It responds to messages trigged by image input buttons. It processes key scan code message sent from tEntry and obtains American Standard Code for Information Interchange image code among image conversion table. Then it sends American Standard Code for Information Interchange image code to tTextArea, therefore on insert and show the image code. Fig. one shows the inner task communication (IPC for short) among the most half dozen tasks. during this program, the communication is generally enforced by message queues. It conjointly involves a semaphore therefore on notice the synchronization between 2 tasks. In the Fig. 1, the semaphore is marked by broken line, whereas the message queues ar marked by real lines.

v.MAIN METHOD FLOW

The most vital perform of CCTE is TextArea( ). That task is chargeable for such operations as text show, page down or page up, insert, append, find, etc. All the opposite tasks can send messages to the current perform by message queue, besides, the perform conjointly must use semaphore for implementing synchronization and mutual exclusion with alternative tasks whereas accessing the general public resources. Main operation flow chart of task perform TextArea( ) is illustrated by Fig. 3. The Fig.3 offers a short flow chart of tTextArea task, and its implementation method is additional difficult. At anytime a user adds one character to the emended text; CCTE ought to initial compute the quantity of pages concerning the complete computer file and reinstate the index for every page. Then verify that lines got to be redrawn. After that, CCTE clears these lines and redraw the lines with changed information. If the character adscititious at the tip of 1 page, and so the CCTE's show can show the content of next page.

As shown on the Fig.5, as a result of not all of the letter sequences correspond to Chinese character, if the come price of the highest perform tree—search ( ) is zero, which means the phonetic sequence will notice the corresponding Chinese characters. On the opposite hand, if the come price is one, it means that the phonetic sequence can't notice any corresponding Chinese characters. To show text on the liquid crystal display screen, the perform display—one( ) is invoked, whose parameters embody the position of scan pointer of the target character within the computer file, the colour and size of the text then on. Besides, as a result of a Chinese character is coded in 2 computer memory units whereas associate degree English character is coded in one byte, a come price is required to tell the caller whether or not the displayed character is Chinese or English. The flow chart of this perform is shown within the Fig.6.

VI. CHINESE CHARACTER PROCESS

In this course project, Chinese character matrix library HZK16 is employed for Chinese character show among the emended text. In HZK16 library, each simplified Chinese character code is painted in 2 bytes and accordant dot array matrix has sixteen rows and sixteen columns. HZK16 library is national simplified Chinese code normal revealed at 1980, supporting 6763 Chinese characters and 682 symbols, during which level one has 3755 Chinese characters sorted by phonetic sequence, level 2 has 3008 Chinese characters sorted by simplified radicals[5]. every Chinese character in HZK16 library, that is of size sixteen * sixteen, desires 256 dots to be displayed.

Apart from the show, the editor provides a Pinyin input methodology. For this reason, we tend to construct a key tree[6]. each node in key tree corresponds to a key price. Nodes path that's from root node to any node on the key tree constitutes a Pinyin code of Chinese character. If a node possesses the last letter of 1 Pinyin sequence, the primary Chinese character's GB2312 code of that Pinyin sequence in HZK sixteen is saved in this node. to boot, the quantity of this sort of Chinese characters is additionally saved in this node. once a Pinyin key tree has been designed up, the primary GB2312 code of a bunch Chinese character that has identical input Pinyin sequence may be retrieved by recursive-descent looking routine. the quantity of Chinese characters to the current Pinyin sequence may be retrieved similarly. On common laptop, with a lots of system resources, input strategies is enforced with the most specialise in full performance and convenient operation. In embedded system, however, as a result of the strictly restricted system resource, the most efforts are going to be spent on the potency of the rule and cupboard space. The input strategies applied within the embedded system ought to satisfy such needs as structure compact, straightforward to port and with tiny size of memory. Besides, the input strategies ought to want low computation, as a result of the restricted clock frequency of embedded processors. Association of input is fascinating which may speed up user input, however, this can swell the codes of input methodology that makes it undesirable in embedded system, therefore it all depends on user's demand.

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