附　件

國防科技學術合作協調小組研究計劃成果報告

雷達程式轉換與測試驗證

計劃編號：NSC90-2623-7-009-003

執行期間：90 年 1 月 1 日至 90 年 12 月 31 日

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中華民國　91 年　12 月　31 日

目錄

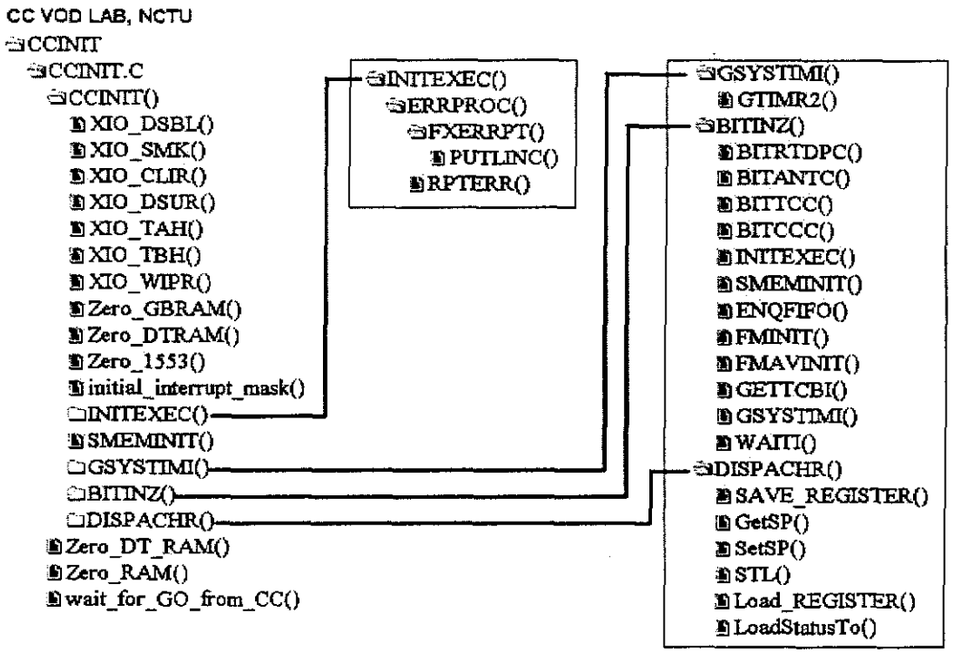
1. 程式轉換結果

1.1. CC（Control Computer）最初接收的原始檔案

共計 322 個檔案，分成 10 個模組與 1 個整體變數的模組。

1.2. 初始化模組（01_Startup）call tree

本模組的功能是對 CC 的各項硬體做初始化的動作，以及與 TC（Track Computer）、Antenna、Radar 等作同步確認的動作，並對 CC 開始運作前所需的各項資料做設定。
模組的詳細內部運作流程以及 Call tree。



1.3. 初始化模組（01_Startup） routines

Call tree 中各個函數功能描述

XIO_DSBL {ccinit.c}→ Disable and mask interrupts
XIO_SMK() {ccinit.c}→ Mask interrupts
XIO_CLIR() {ccinit.c}→ Clear pending interrupts
XIO_DSUR() {ccinit.c}→ Disable start-up ROM
XIO_TAH() {ccinit.c}→ Halt Timer A
XIO_TBH() {ccinit.c}→ Halt Timer B
XIO_WIPR() {ccinit.c}→ Set page register A to point to EEPROM
Zero_GBRAM() {}→ Clear out global RAM area
Zero_DTRAM() {}→ Clear the DT RAM area
Zero_1553 {}→ Clear the 1553 message area
initial_interrupt_mask {ccinit.c}→ Initialize the task dispatcher interrupt mask
INITEXEC {}→ Initialize the executive
INITQUE {}
ERRPROC {}
FXERRPT {}
PUTLINC()→
RPTERR()→
SMEMINIT()
GSYSTIMI {}→Initialize shared memory
GTIMR2()→Get the current system time
BITINZ {}
BITRTDPC()→Command the RTDP to perform the CPU Test
BITANTC()→Command the Antenna to perform the CPU Test
BITTCC()→Command the TC to perform the CPU Test
BITCCC()→Command the CC CPU self test
INITEXEC()→Initialize executive variables
SMEMINIT()→Initialize shared memory
ENQFIFO()→Put buffer in YIELD base chain
FMINIT()→Initialize Avionics Interface communications function
FMAVINIT()→Initialize 1553 Data Bus
GETTCBI()→Get a task control block for the BIT Command Task
GSYSTIMI()→Enter the current system time
WAITI()→Schedule the BIT Reset Task

DISPACHR {}→ Dispatch control to appropriate instruction counter

SAVE_REGISTER()→Save current Background task registers

GetSP()→Save background system stack pointer

SetSP()→Load foreground system stack pointer

STL()→

Load_REGISTER()→Restore background task's registers

LoadStatusTo()→Transfer control to appropriate IC,RETURN from interrupt

Zero_DT_RAM() {ccinit.c}→

Zero_RAM() {ccinit.c}→

wait_for_GO_from_CC() {ccinit.c}→

Call tree 的流程中各個函數的細部功能內容（虛擬碼）

CCINIT()

```
 /*以下設定一些硬體設定*/
.Disable and mask interrupts and clear pending interrupts
.Disable start-up ROM
.Halt Timer A
.Halt Timer B
.Set page register A to point to EEPROM
.Set page register B to point to EEPROM
 /*清除 synchronization words ，synchronization word 是機器間溝通的 flag*/
.Clear the synchronization words
 /* 將 SYNTC 設為 0x0300 表示 TC 可以啓動了*/
.Start the TC
 /*理論上應該和 Start the TC 做一樣的事，可是做的事不太一樣(已解決)*/
.Start the RTDP
.Start the Antenna
 /*清除 memory 內容*/
.Clear out global RAM area
.Clear the DT RAM area
.Clear the 1553 message area
 /*初始化*/
.Initialize Stack Pointer
.Initialize the task dispatcher interrupt mask
.Initialize the executive
.Initialize shared memory
.Set the error code no. = 0 to print the "MMR status monitor" banner
.Get the current system time
.Add 2 seconds to the current system time
.Reset the deadman timer
 /*這裡是一個 while loop 等待在兩秒之內，若
  *SYNTC，SYNANT,SYNRTDP 都變成 1
  *就跳出迴圈
  */
.Wait up to two seconds for all processors to report ready status
  -Read the current system time
  -Reset the Deadman Timer
.Reset the deadman timer
```

.Set the synchronization words for normal operation
.Set power up BIT flag
.Invoke BIT
.Transfer control to the dispatcher

1.4. 問題與解決狀況

暫時無法實作的硬體相關函數，其程式碼所在位置，以及功能。

所在檔案	指令、函數	功用	相關硬體	備註
ccinit.c	XIO_DSBL	disable interrupt	interrupt mask register	
ccinit.c	XIO_SMK	set interrupt mask	interrupt mask register	
ccinit.c	XIO_CLIR	clear interrupt request	pending interrupt register	
ccinit.c	XIO_DSUR	disable sart up ROM	sart up ROM	
ccinit.c	XIO_TAH	Halt timer A	timer A	
ccinit.c	XIO_TBH	Halt timer B	timer B	
ccinit.c	XIO_WIPR	write instruction page register	page register	
ccinit.c	Zero_GBRAM	clear global RAM	Global RAM	
ccinit.c	Zero_DTRAM	clear DT RAM	DT RAM	
ccinit.c	Zero_1553()	Clear the 1553 message area	1553 start/reset register reset bit	
ccinit.c	init SP	initial SP	Stack Pointer	
ccinit.c	init MASK	initial task dispature interrupt	task dispature interrupt	
bitinz.c	Zero out RAM	Zero out RAM between the interrupt vector table and H'1000'	RAM interrupt vector	
bitinz.c	SP = STACKADR CURSTAT=H'6134	Initialize the SP Initialize the task interrupt mask dispatcher|	stack pointer interrupt mask	
bitinz.c	XIO_CLIR	clear interrupt request	interrupt register	
bitinz.c	XIO_OTA	output Timer A	Timer A	
bitinz.c	XIO_ENBL	enable interrupt	interrupt mask register	

1.5. 選取 03_ModeCtrl 模組

- 選出下一個要翻譯的模組, 根據下列描述
  - 中科院所提供的優先權檔案列表
  - 與目前的模組比對
  - 挑選符合優先次序的模組檔案重要性列表

========== CC file list Page 3 to Page 8 ==========

%CCBH%
檔名 模組 翻過 優先權
RDBINT 1750 Y 1
RDBOUTP 1750 Y
RDBOUTPI 1750 Y
CHCKSUM 1750 Y
CCGLBEQU Global Y
CCGLBROM Global Y
CCGLBRAM Global Y
CCIO Global Y
COM17IO 1750 Y
DTRAM Global Y
DTROM Global Y
DTEQU Global Y
CCROM Global Y
CCRAM Global Y
CCEQU Global Y

%INITPROC%
檔名 模組 翻過 優先權
CCINIT 01_startup Y 1
STRTUP 01_startup N
FMINIT 01_startup Y
FMAVINIT 01_startup Y
MCINIT 01_startup Y
MPINIT 03_ModCtrl N
LUINIT 01_startup Y
SCINIT 01_startup Y
TANTOUTP 05_TrackProcess N
TRKPRC 05_TrackProcess N
CCSTAXTR 02_Avionics N

%AVINPROC%
檔名 模組 翻過 優先權
TWSMAINT 05_TrackProcess N 1
TWSEXTRP 05_TrackProcess N
FMACMMOD 02_Avionics N
GMSMPROC 02_Avionics N
CCMAINTP 05_TrackProcess N
ADJPARAM 02_Avionics N
FMPARCHG 02_Avionics N
RNGPROC 02_Avionics N
CHGVELSL 02_Avionics N
CHGRNGSL 02_Avionics N
AZPROC 02_Avionics N
FMAVPROC 02_Avionics N
CCVNUM 02_Avionics N
FMINPROC 02_Avionics N
FMRCVSWP 02_Avionics N
FMAVERR 02_Avionics N

FMMC041 02_Avionics N
FMMC042 02_Avionics N
FMMC043 02_Avionics N
FMDBSPRO 02_Avionics N
FMIDS041 02_Avionics N
FMIDS042 02_Avionics N
FMIDS043 02_Avionics N
FMADC041 02_Avionics N
FMINSTINT 02_Avionics N
FMINSPRO 02_Avionics N
FMINS041 02_Avionics N
FMMC044 02_Avionics N
FMTIMOUT 02_Avionics N
FMCIU041 02_Avionics N
FMCIU042 02_Avionics N

%AVOTPROC%
檔名 模組 翻過 優先權
FMOTPROC 02_Avionics N 1
FMXMTSWP 02_Avionics N
FMXMTSWP2 02_Avionics N
FMRDR001 02_Avionics N
TRKPRARM 02_Avionics N
FMRDR003 02_Avionics N
FMRDR004 02_Avionics N
FMRDR005 02_Avionics N
FMRDR022 02_Avionics N
FMRDR023 02_Avionics N
FMRDR024 02_Avionics N
FMRDR211 02_Avionics N
FMTWS211 02_Avionics N
FMSTTTWS 02_Avionics N
FMRDRMOD 02_Avionics N
FMMC046 02_Avionics N
FMTELPRO 02_Avionics N
CVTIME 02_Avionics N

%MODECNTL%
檔名 模組 翻過 優先權
MCMDCNTL 03_ModeCtrl N 1
MPMDDET 03_ModeCtrl N
MPNORM 03_ModeCtrl N
MPDFLT 03_ModeCtrl N
MPTRANS 03_ModeCtrl N
MPTERM 03_ModeCtrl N
CALCLOAD 03_ModeCtrl N
MCRNGSCL 03_ModeCtrl N
MCTWSRNG 03_ModeCtrl N
MTRINIT 03_ModeCtrl N
MPVSS 03_ModeCtrl N
MPVSP 03_ModeCtrl N
MPVSV 03_ModeCtrl N
MPVSMS 03_ModeCtrl N
AGRSTBY 03_ModeCtrl N

%MODEAIR1%
檔名 模組 翻過 優先權
MPLUS 03_ModeCtrl N 1
MPULSP 03_ModeCtrl N
MPLUV 03_ModeCtrl N
MPLUBS 03_ModeCtrl N
MPLDS 03_ModeCtrl N
MPDLSP 03_ModeCtrl N
MPLDV 03_ModeCtrl N
MPLDBS 03_ModeCtrl N
MPTWSS 03_ModeCtrl N

%MODEAIR2%
檔名 模組 翻過 優先權
MPACS 03_ModeCtrl N 1
MPACP 03_ModeCtrl N
MPACV 03_ModeCtrl N
MPACBS 03_ModeCtrl N
MPAULS 03_ModeCtrl N
MPAULSP 03_ModeCtrl N
MPAULV 03_ModeCtrl N

MPAULBS 03_ModeCtrl N
MPADLS 03_ModeCtrl N
MPADLSP 03_ModeCtrl N
MPADLV 03_ModeCtrl N
MPADLBS 03_ModeCtrl N
MPASMRNG 03_ModeCtrl N
MPSTBY 03_ModeCtrl N

%MODESTT%
檔名 模組 翻過 優先權
MPSTTIR 03_ModeCtrl N 1
MPSTTIT 03_ModeCtrl N
MPSTTUT 03_ModeCtrl N
MPSTTC 03_ModeCtrl N
MPSAS 03_ModeCtrl N
MPSTAT 03_ModeCtrl N
MPSTRR 03_ModeCtrl N

%MODEGND1%
檔名 模組 翻過 優先權
MPMAPN 03_ModeCtrl N 1
MPMAPF 03_ModeCtrl N
MPMAPX 03_ModeCtrl N
MPMAPXF 03_ModeCtrl N
MPSEAN 03_ModeCtrl N
MPSEAF 03_ModeCtrl N
MPMTIMVR 03_ModeCtrl N
MPMTIMAP 03_ModeCtrl N
MPMTIGMF 03_ModeCtrl N
MPAGR 03_ModeCtrl N
MPBIT 03_ModeCtrl N

%MODEDBS%
檔名 模組 翻過 優先權
DBSVALID 06_DopplerBean N 2
MPDBSLW 03_ModeCtrl N 2
MPDBSIN 03_ModeCtrl N 2
MPDBSA 03_ModeCtrl N 2
MPDBSP 03_ModeCtrl N 2
MPDBSF 03_ModeCtrl N 2

%MOSDESMTT%
檔名 模組 翻過 優先權
MPSMTTV 03_ModeCtrl N 2
MPSMITBS 03_ModeCtrl N 2
MPSMTTIR 03_ModeCtrl N 2
MPSMTTIT 03_ModeCtrl N 2
MPSMTTUT 03_ModeCtrl N 2
MPSMTTC 03_ModeCtrl N 2

%ANTAIR1%
檔名 模組 翻過 優先權
LRUANTM 04_LRUCtrl N 1
ANTBITP 04_LRUCtrl N 1
ANTSTBY 04_LRUCtrl N 1
ANTNAMS 04_LRUCtrl N 1
ANTNAMSP 04_LRUCtrl N 1
ANTACS 04_LRUCtrl N 1
ANTASMS 04_LRUCtrl N 1
ANTASMSP 04_LRUCtrl N 1
ANTASMBS 04_LRUCtrl N 1
ANTVSSP 04_LRUCtrl N 1
ANTWS 04_LRUCtrl N 1

%ANTAIR2%
檔名 模組 翻過 優先權
ATACSLV 04_LRUCtrl N 1
ANTAIR 04_LRUCtrl N 1
ANTAIT 04_LRUCtrl N 1
ANTAVER 04_LRUCtrl N 1
ANTBOX 04_LRUCtrl N 1
ANTSAS 04_LRUCtrl N 1
ANTRR 04_LRUCtrl N 1

%ANTAGND%

ANTSMAP 04_LRUCtrl N 2
ANTSMAPX 04_LRUCtrl N 2
ANTSMVR 04_LRUCtrl N 2
ANTEF 04_LRUCtrl N 2
ANTGBOX 04_LRUCtrl N 2
ANTAGR 04_LRUCtrl N 2
ANTDBSLI 04_LRUCtrl N 2
ANTDBSA 04_LRUCtrl N 2
ANTDBSP 04_LRUCtrl N 2
ANTMPSEA 04_LRUCtrl N 2
ANTGIR 04_LRUCtrl N 2
MPCKANTP 03_ModeCtrl N 2
MPCKANTB 03_ModeCtrl N 2

%SCOUTGEN%
檔名 模組 翻過 優先權
SCOUTGEN 04_LRUCtrl N 1
AZELCEN 04_LRUCtrl N 1
TWSCEN 04_LRUCtrl N 1
CURRNGAZ 04_LRUCtrl N 1
FREEZXY 04_LRUCtrl N 1
SAMALT 04_LRUCtrl N 1
SWEEPXY 04_LRUCtrl N 1
SYMFLGS 04_LRUCtrl N 1
REASYM 04_LRUCtrl N 1
AGRLOCK 04_LRUCtrl N 1
STEERXY 04_LRUCtrl N 1
CURSFRZ 04_LRUCtrl N 1
STABCUE 04_LRUCtrl N 1
CURSAA 04_LRUCtrl N 1
CURSAS 04_LRUCtrl N 1
CURMAN 04_LRUCtrl N 1
CURSNORM 04_LRUCtrl N 1
VELCURS 04_LRUCtrl N 1

%CT50PROC%
CONT50HZ 04_LRUCtrl N 1
DOPFLBL 04_LRUCtrl N 1

RTPDPVLOS 04_LRUCtrl N 1

%RSPPROC%
LRUMAN 04_LRUCtrl N 1
RTDPNSP 04_LRUCtrl N 1
RTDPNACQ 04_LRUCtrl N 1
RTDPASP 04_LRUCtrl N 1
RTDPAACQ 04_LRUCtrl N 1
RTDPAC 04_LRUCtrl N 1
RTDPVSS 04_LRUCtrl N 1
RTDPTWS 04_LRUCtrl N 1
MDL1MES 08_Mdl N 1
MDL2MES 08_Mdl N 1
MDLTIME 08_Mdl N 1
RTDPMDL 08_Mdl N 1

%RPGND1%
RTDPMSA 04_LRUCtrl N 2
RTDPMAPX 04_LRUCtrl N 2
RTDPDBS 04_LRUCtrl N 2
RTDPSMTT 04_LRUCtrl N 2
RTDPFRZ 04_LRUCtrl N 2
RTDPSTBY 04_LRUCtrl N 2

%TCPROC%
LRUTCM 04_LRUCtrl N 1
TCCONT 04_LRUCtrl N 1
TCACQ 04_LRUCtrl N 1

%RIPPROC%
RIPANT 07_Radar N 1
RIPRTDP 07_Radar N 1
RIPEND 07_Radar N 1
BCPICAL 03_ModeCtrl N 1
AUTORNG 03_ModeCtrl N 1
MDL10 08_Mdl N 1
MDL2040 08_Mdl N 1

%DBSPROC%
CCPINTP 06_DopplerBean N 2
DBSINSP 06_DopplerBean N 2
DBSLEWP 06_DopplerBean N 2
DBSPUSP 06_DopplerBean N 2
DBSINTSK 06_DopplerBean N 2
DBSPPD 06_DopplerBean N 2

%INSTPROC%
FMFTPROC 02_Avionics N 1
FTMSGHDR 02_Avionics N 1
MSGCSD 02_Avionics N 1
MSGTWS 02_Avionics N 1
RTDPMSG 02_Avionics N 1
RPTERR 02_Avionics N 1

%BIT%
FMBITPRO 09_Dignostic Y 3
DTCMD 09_Dignostic Y 3
BITINZ 09_Dignostic Y 3
BITRTDPC 09_Dignostic Y 3

最後選出包含最多優先權為 1 的模組
03_ModeCtrl(73 files)

2. 程式轉換環境與工具

2.1. 輔助工具的導入

為了增進翻譯工作的順利進行，我們著手發展工具程式，並導入一些已經被大量使用的輔助工具，俾使工作能更加有效率、更加精確。
這些工具包括

- 自行發展：
  - 模組分析工具，用來找出變數所在檔案位置，並追蹤描繪出 call tree 以及 called tree。
  - 半自動測試程式，用來幫助產生測試模組所需的程式碼，並產生相關報表。
- 目前已有的工具：
  - cvs。
  - bug tracking。
  - project search engine。

2.2. 分析工具

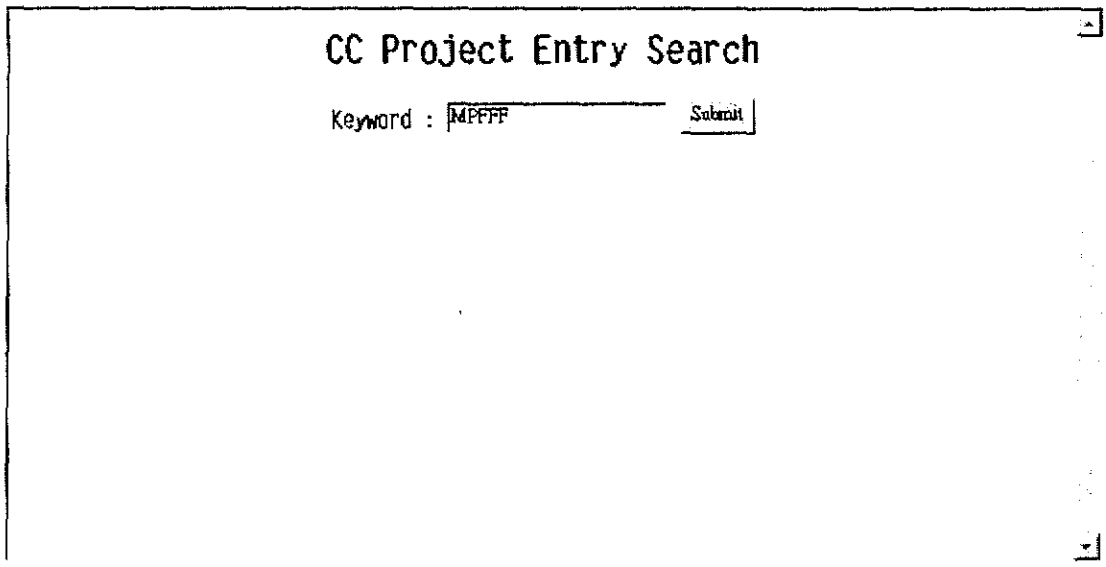
自行發展程式分析工具，進行整個 CC 程式的追蹤分析

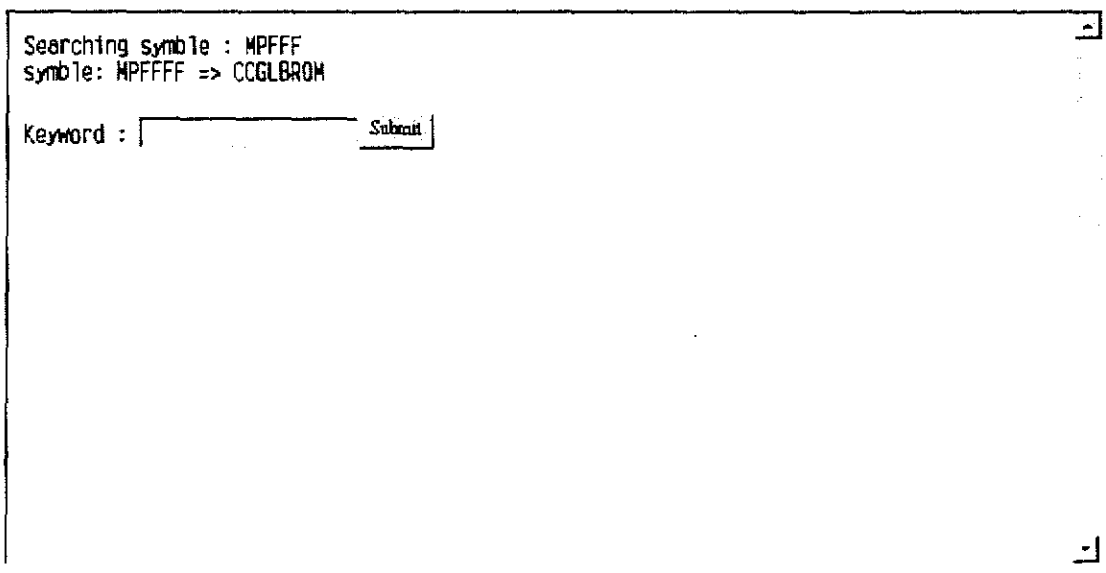
```
<<< Call Tree >>>
BITPHS03->DTRAM->DTROM->DTEQU
    BITCDPC->DTRAM->EXECRAM->DTROM->DTEQU->CCGLBEQU->EXECEQU
        DTCMD->DTRAM->DTEQU->COM17IO->CCIO
            RDBOUTP
                RDBOUTPI->CCGLBROM->CCIO->CCGLBEQU
                    ERRPROC->EXECRAM->CCIO->CCGLBRAM->CCGLBEQU
                        RPTERR->CCGLBRAM->EXECEQU->CCGLBEQU->CCIO->EXECRAM
                            FMXMTSWP->CCGLBRAM->CCGLBEQU->CCIO
                            FTMSGHDR->CCGLBRAM->EXECRAM->CCGLBEQU
                        FXERRPT->EXECRAM->CCGLBRAM->EXECROM
                            BINASCI
                            PUTLINC->EXECEQU->CCIO
                    RELBUFI->EXECRAM
                        ERRPROC **
            SMOUTP
                SMOUTPI->CCIO->EXECRAM->EXECEQU
                    ENQUEUEI->CCIO
                        LINK->CCIO
                    ERRPROC **
                    RELBUFI **
    BITPTCOM->DTRAM->DTEQU
        BITANTC->DTRAM->EXECRAM->CCGLBRAM->DTROM->CCGLBROM->DTEQU->CCGLBEQU->EXECEQU
            DTCMD **
        BITCCC->DTRAM->CCGLBRAM->EXECRAM->DTROM->DTEQU->CCGLBEQU->EXECEQU->CCIO
            BITDPRSM->DTRAM->DTEQU->CCIO
                DTERST->DTRAM->DTEQU
                SMEMINIT->COM17IO->EXECRAM


***** Entry::Module
    AA:CCGLBEQU         AACURLM:CCROM       AAVGX:CCGLBRAM      AAVGY:CCGLBRAM
    AAVGZ:CCGLBRAM      AAZH:COM17IO        ACMACQ:CCGLBRAM     ACMB:CCGLBEQU
    ACMBAR:CCGLBROM     ACMBSA:CCGLBEQU     ACMBSS:CCGLBEQU     ACMCHK:CCGLBRAM
    ACMCURAZ:CCGLBRAM   ACMCURLM:CCGLBROM   ACMCURNG:CCGLBRAM   ACMHALF:CCGLBROM
    ACMI:CCGLBEQU       ACMID:COM17IO       ACMINC:CCGLBROM     ACMRUN:CCGLBRAM
    ACMSLW:CCGLBEQU     ACMSPTIM:CCGLBRAM   ACMSS:CCGLBEQU      ACMTIM:CCGLBRAM
    ACMVAQ:CCGLBEQU     ACQPOS:CCGLBRAM     ACQTIM:CCGLBRAM     ACSDET:COM17IO
    ACSNOT:COM17IO      ACSRPT:COM17IO      ACSTIME:CCGLBROM    ACTCOMP:CCGLBRAM
    ACTIVTSK:EXECRAM    ACTIVTSK:EXECRAM    AD:CCGLBRAM         ADDR1:MCRAM
    ADDR2:MCRAM         ADJFLAG:DTRAM       AELH:COM17IO        AG:CCGLBEQU
    AGRDV:COM17IO       AGRDVT:COM17IO      AGRMOD:COM17IO      AGRRE:COM17IO
    AGRSLRC:COM17IO     AGRSTBYF:CCGLBRAM   AGRSYR:CCGLBRAM     AGTORG:CCGLBRAM
    ALPHA:COM17IO       ANGEND:COM17IO      ANGRES:CCGLBRAM     ANGRLIM:CCGLBROM
    ANGSTR:COM17IO      ANGSTRT:CCGLBRAM    ANT:CCGLBEQU        ANTACM:CCGLBEQU
    ANTACQ:CCGLBEQU     ANTADR:CCGLBROM     ANTAZACC:CCGLBRAM   ANTBIT:CCGLBEQU
    ANTCKS:CCGLBRAM     ANTCKSUM:COM17IO    ANTDBSAC:CCGLBEQU   ANTDBSLW:CCGLBEQU
    ANTDPR:CCIO         ANTELACC:CCGLBRAM   ANTERR:CCGLBRAM     ANTFAIL:DTRAM
    ANTFIGB:CCGLBEQU    ANTFORCE:CCGLBRAM   ANTFTIME:DTRAM      ANTIND:CCGLBROM
    ANTLONG:CCGLBEQU    ANTLTCH:CCGLBEQU    ANTMAX:CCGLBRAM     ANTMED:CCGLBEQU
    ANTMINI:CCGLBEQU    ANTMOD:CCIO         ANTMSGI:CCIO        ANTMSGO:CCIO
    ANTNDX:CCGLBRAM     ANTNUM:CCGLBROM     ANTPOIN:CCGLBEQU    ANTPOW:DTRAM
    ANTPTR:CCGLBROM     ANTRCW:CCGLBROM     ANTSAMS:CCGLBEQU    ANTSEL:CCGLBRAM
    ANTSEQ:CCGLBRAM     ANTSLEW:CCGLBEQU    ANTSNTI:CCGLBEQU    ANTSPLT:CCGLBEQU
    ANTSRCH:CCGLBEQU    ANTSTA:CCGLBRAM     ANTSTAT:CCIO        ANTSTOW:CCGLBEQU
    ANTSTRT:CCGLBRAM    ANTTIM:CCIO         ANTTIME:DTRAM       ANTTRK:CCGLBEQU
    ANTVSP12:CCGLBEQU   ANTVSP3:CCGLBEQU    ANTWRD3:CCGLBRAM    ANTWRD4:CCGLBRAM
    ANTWRD5:CCGLBRAM    ANTWRD6:CCGLBRAM    AP:CCGLBRAM         AQAZ:COM17IO
```

2.3. 變數搜尋程式

配合前述的模組分析工具，提供查詢的工具，與 project search engine 相比，本程式可以確切找出定義該符號的檔案，而 project search engine 則是找出所有相關的檔案。有些場合需要找出定義某個符號所在的檔案，而有些場合則是要找出所有相關於該符號的所有檔案，因此會有這兩種不同功能的查詢工具。其執行過程如下。





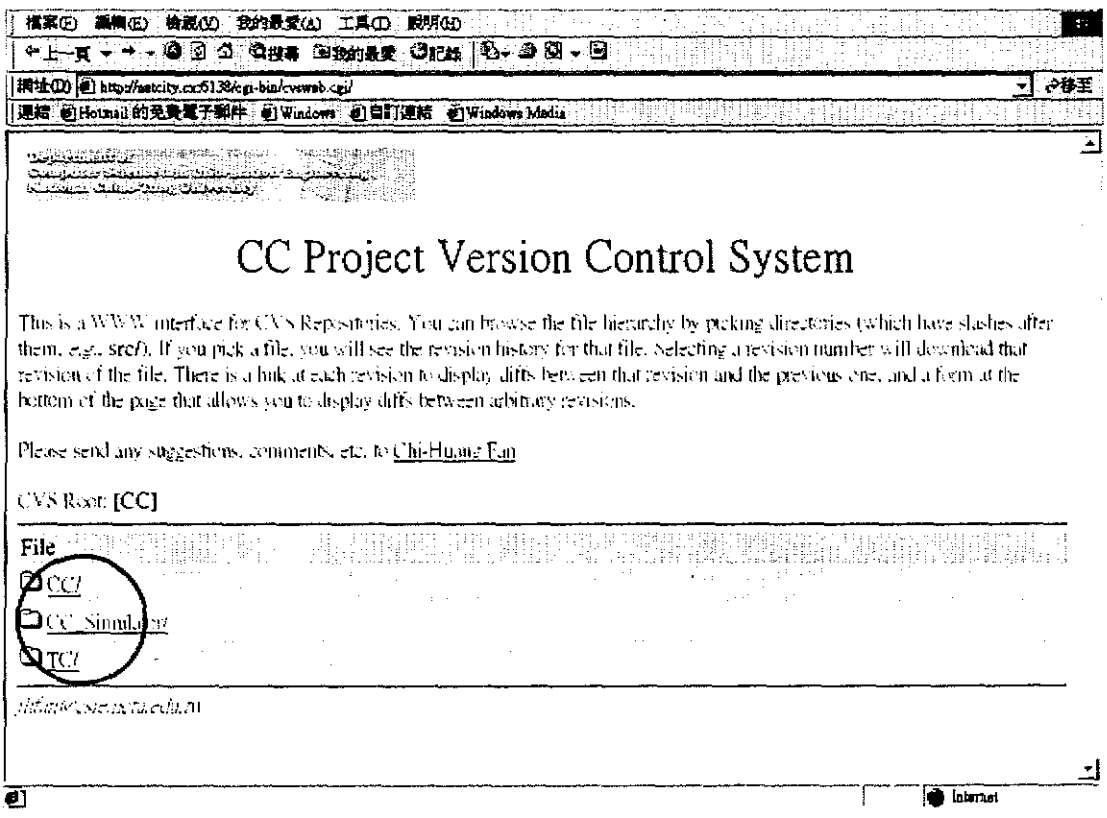
2.4. 版本控管系統（cvs）的導入

cvs （concurrent version system）是一個版本控制系統，他可以記錄程式碼修改的過程，建立一個完整的 history list。當你在修改程式碼的時候，不小心寫出了一個 bug，但是你可能很久以後才發現多出了這個 bug，這個時候，cvs 就能很有效的幫助你，找出到底是在哪一次的修改中，出現了這個 bug。另外，cvs 在版本更改間，只儲存他們的 diff 檔，這樣可以很有效的省下很多空間。多人一起發展軟體的時候，更能顯示出 cvs 的好處。cvs 支援 remote access，user 並可以對他要修改的檔案加上 edit 的 flag，讓別人知道他要修改這個檔案。

CVS web:

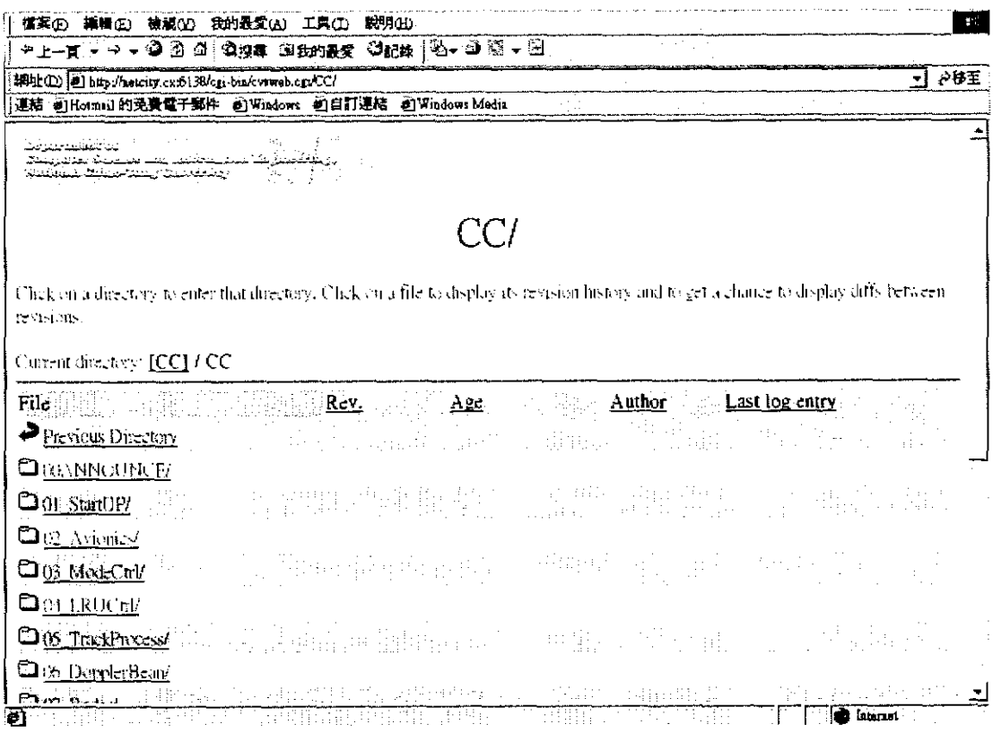
將 CVS 的記錄以網頁的方式呈現，使 CVS 在使用上更加的方便

1. 首頁



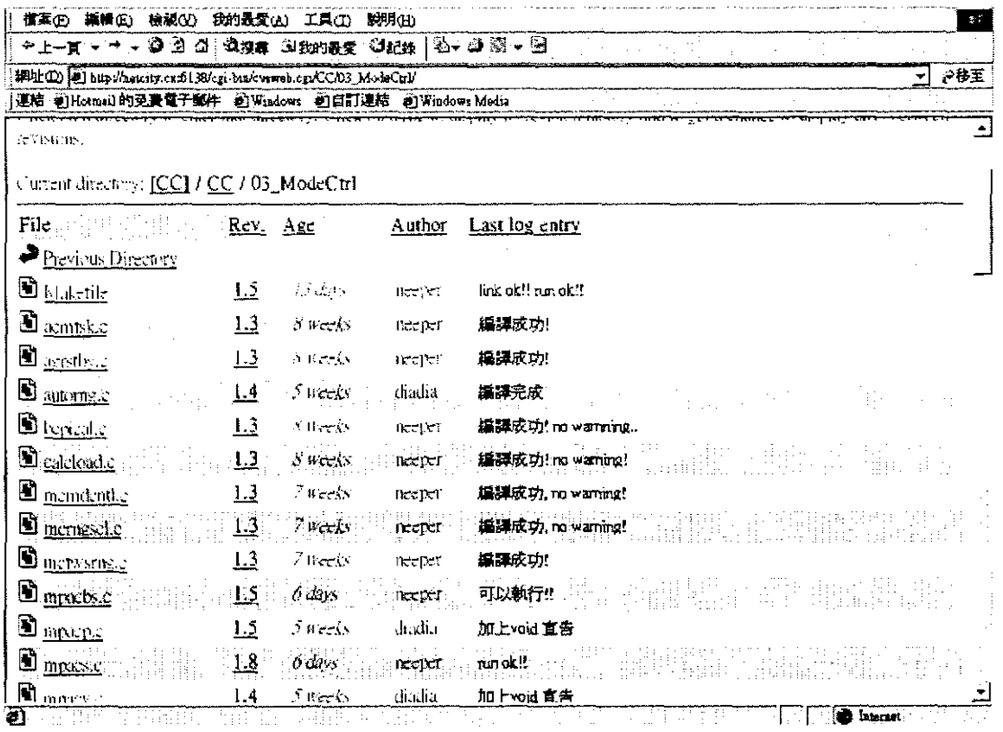
紅色圈起來的部分是此 CVS server 所管理的專案名稱，在這裡一共有三個專案

2. 專案



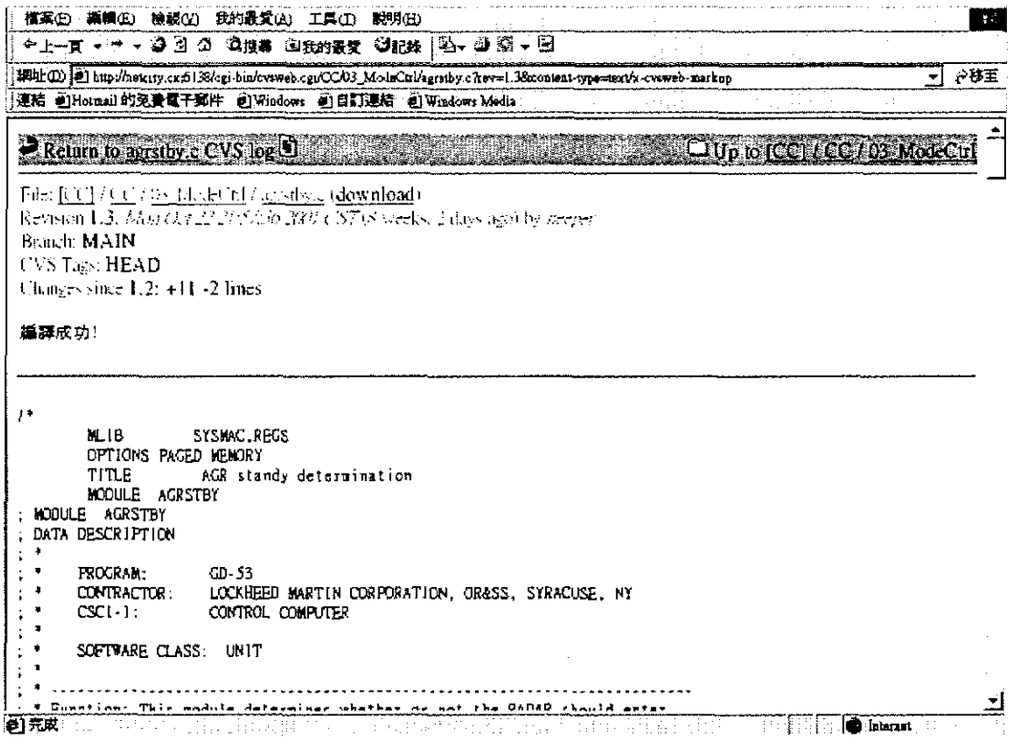
專案 CC 中的各個目錄

3. 主畫面



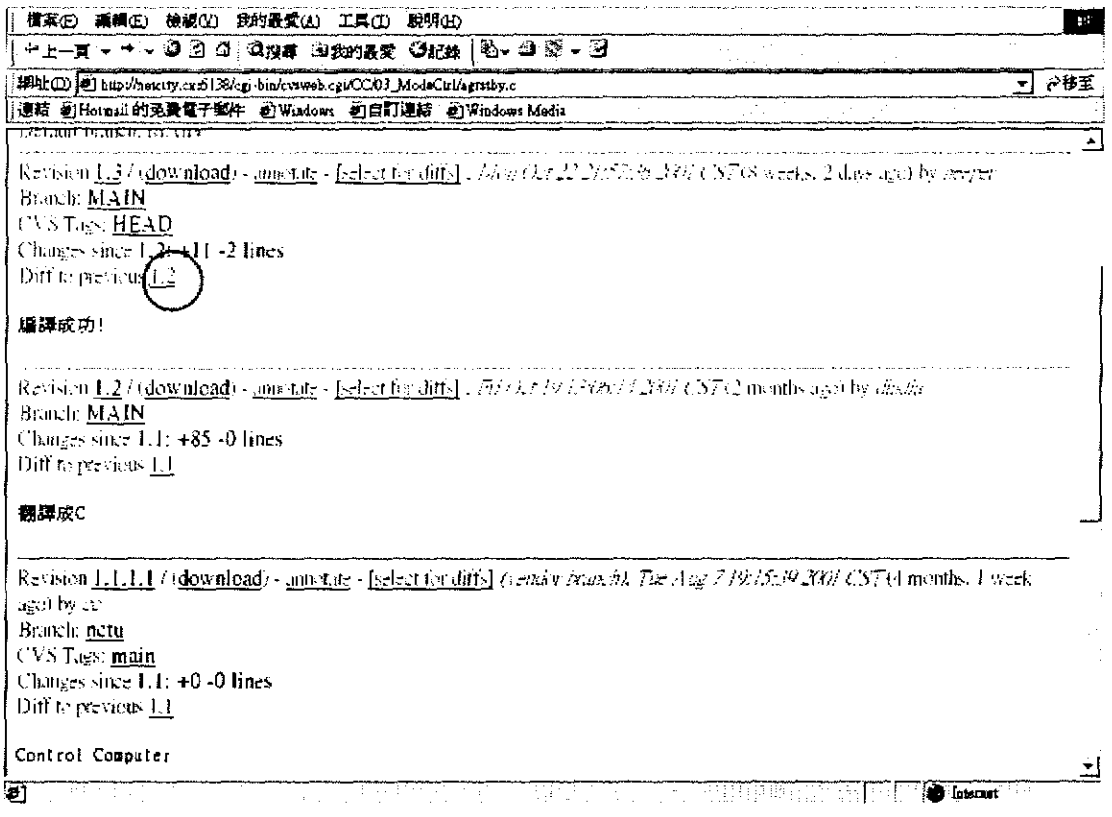
CVS web 的主畫面，從左到右分別是檔名，版本編號，更動時間，最後更動者及 comment。

4. 檢閱原始碼



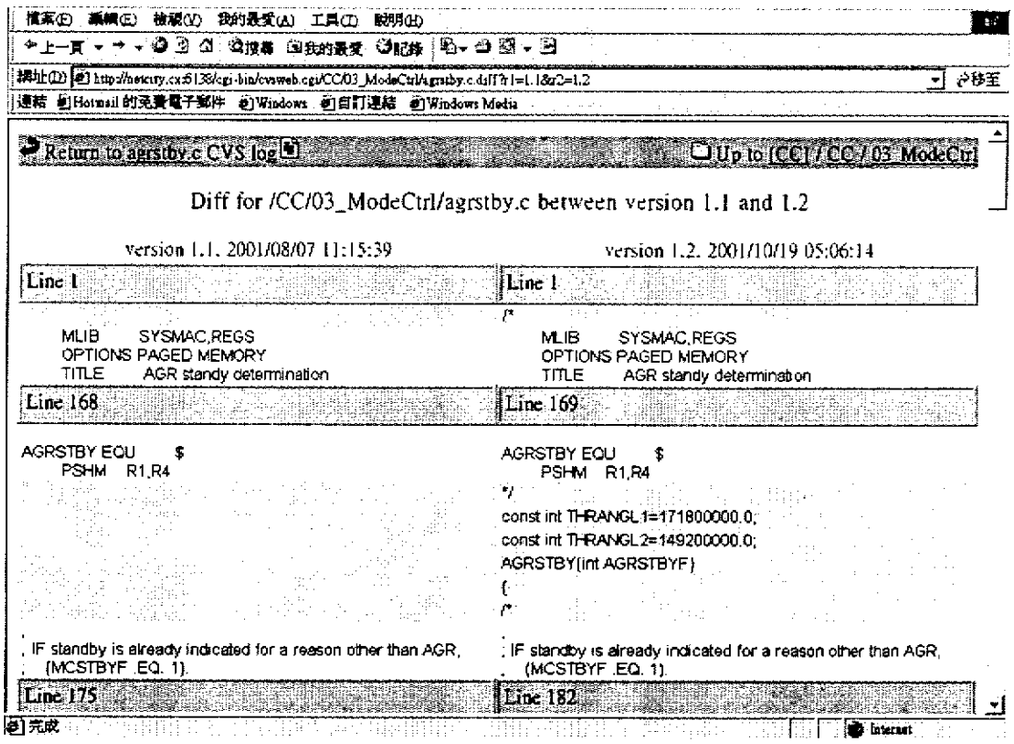
點選版本編號，則會顯示目前的程式碼，在程式碼之前則是 CVS 的一些紀錄和註解。

5. 檢閱更動紀錄



點主畫面的檔名，則會顯示此檔案的更動紀錄及每次更動的註解，若點選了綠色框線的" Differ to previous"則會顯示此版和前一版的差異處。

6. 版本間的變動



將兩個版本的程式碼不同處顯示出來，左半邊的是前一版的程式碼，右半邊是目前這一版的程式碼。有差異的地方會以色塊特別標示起來。

2.5. 臭蟲回報管理系統（bug tracking）的導入

我們了解像 CC 這樣大的系統，在做軟體開發時，所遇到的困難和問題一定相當的多，而這些問題若沒有一個方便的機制幫我們作管理，確認，追蹤，那麼在無形之中，往往會遺漏一些尚未解決的問題，造成整個軟體品管出現問題，因此我們決定引入一套 bug tracking system 來幫助我們管理整個 CC bugs，藉由這樣的系統，我們可以方便查詢，修改某個 bug 的情況，並追蹤這個 bug 是否 fixed. 開發人員藉由 Web-based 的介面，方常方便的輸入 bug，管理 bug，並系統會自動 E-mail 通知相關人員處理 bug，增加團隊工作效率，不但不會造成人員負擔，反而有助於工作效率，溝通，和管理.

這套 bug tracking system 是 Open Source Freeware 的 Mantis.(http://mantisbt.sourceforge.net/)

主要的功能和特色:

1. Web-based 介面，簡單易用，platform dependant.
2. 完整 Bug 管理功能(新增，修改，Memo，Search，Notify.. etc.)
3. 具有權限控管機制，針對不同等級人員有不同的權限.
4. 有簡易的公告欄和專案文件中心.
5. 可以同時管理多個專案.
6. 完整的說明文件.

功能畫面說明:

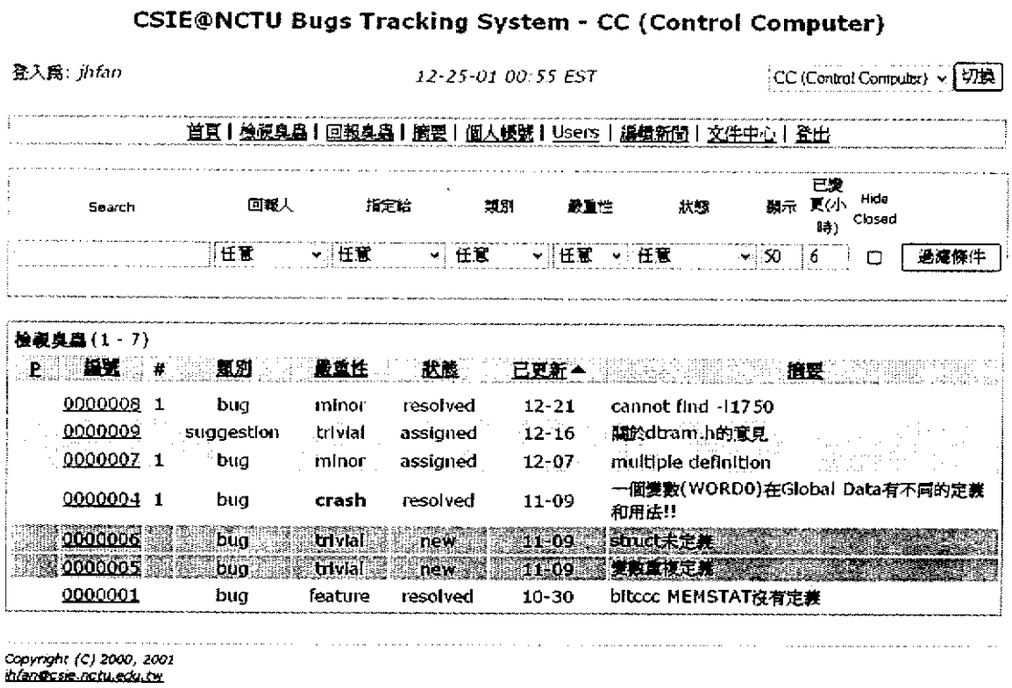


Fig. 1 bug 清單，可以按照指定條件做篩選，可供快速瀏覽.

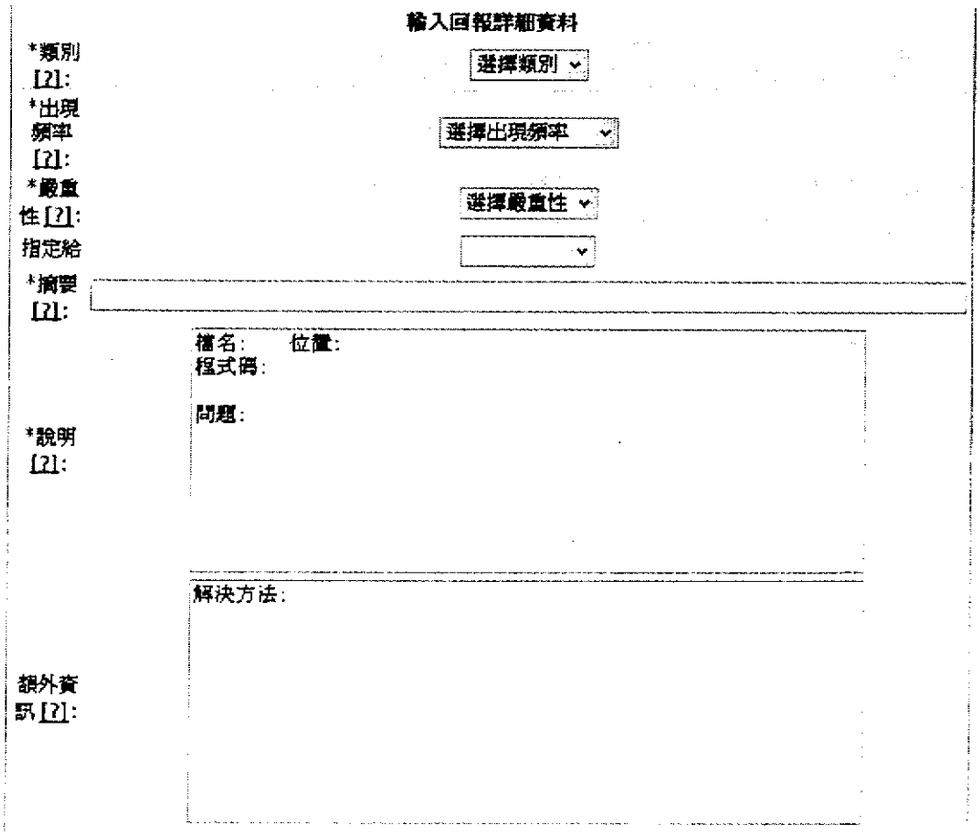


Fig. 2 bug 輸入介面，說明欄位中，預設 CC 所需要的基本資訊.

檢視臭蟲詳細資料(簡式)

編號	類別	嚴重性	出現頻率	回報日期	上次更新
0000008	bug	minor	sometimes	12-16 22:22	12-21 13:36

回報人	leesh		
指定給	jhfan		
優先權	normal	解析度	fixed
狀態	resolved	複製編號	

摘要: cannot find -l1750
檔名:未知位置:CC/include/1750
程式碼:未知

說明:
問題:
make mpagr TEST=MPAGR
gcc -D__TEST_MPAGR__ -I../include -I../include/1750 -I../include/cdp -I../include/cc -I../include/struct -L../lib -l1750 mpagr.c -o mpagr
/usr/bin/ld: cannot find -l1750
collect2: ld returned 1 exit status
make: *** [mpagr] Error 1

額外資訊: 解決方法:

Attached Files

更新臭蟲 | 刪除臭蟲

Fig. 3-1 bug 檢視介面.

Upload File

檔案路徑 [ ] 瀏覽...

上傳檔案

臭蟲筆記

jhfan 12-21 13:36 [Edit] [刪除]	請先至CC/global/1750下, 打make, 會產生lib1750.a 這個library檔. 並確定這個檔已搬至CC/lib底下.

Fig. 3-2 Bug 檢事件介面, User 可以對 bug 加上註解(Notes).

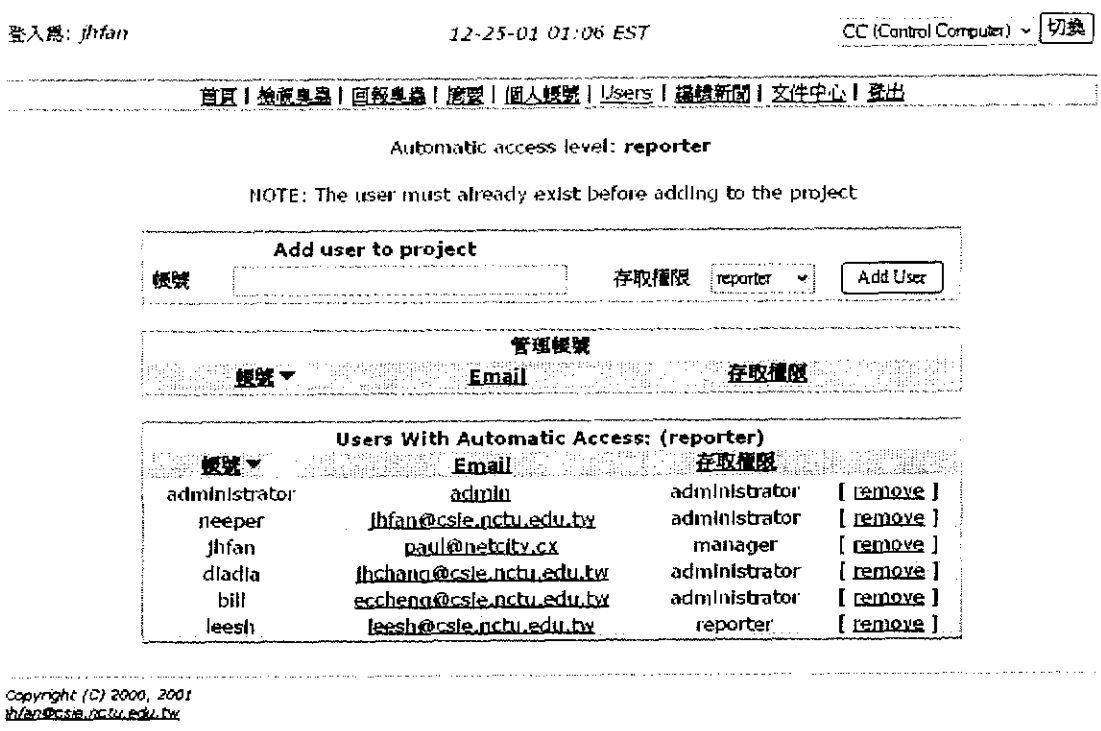


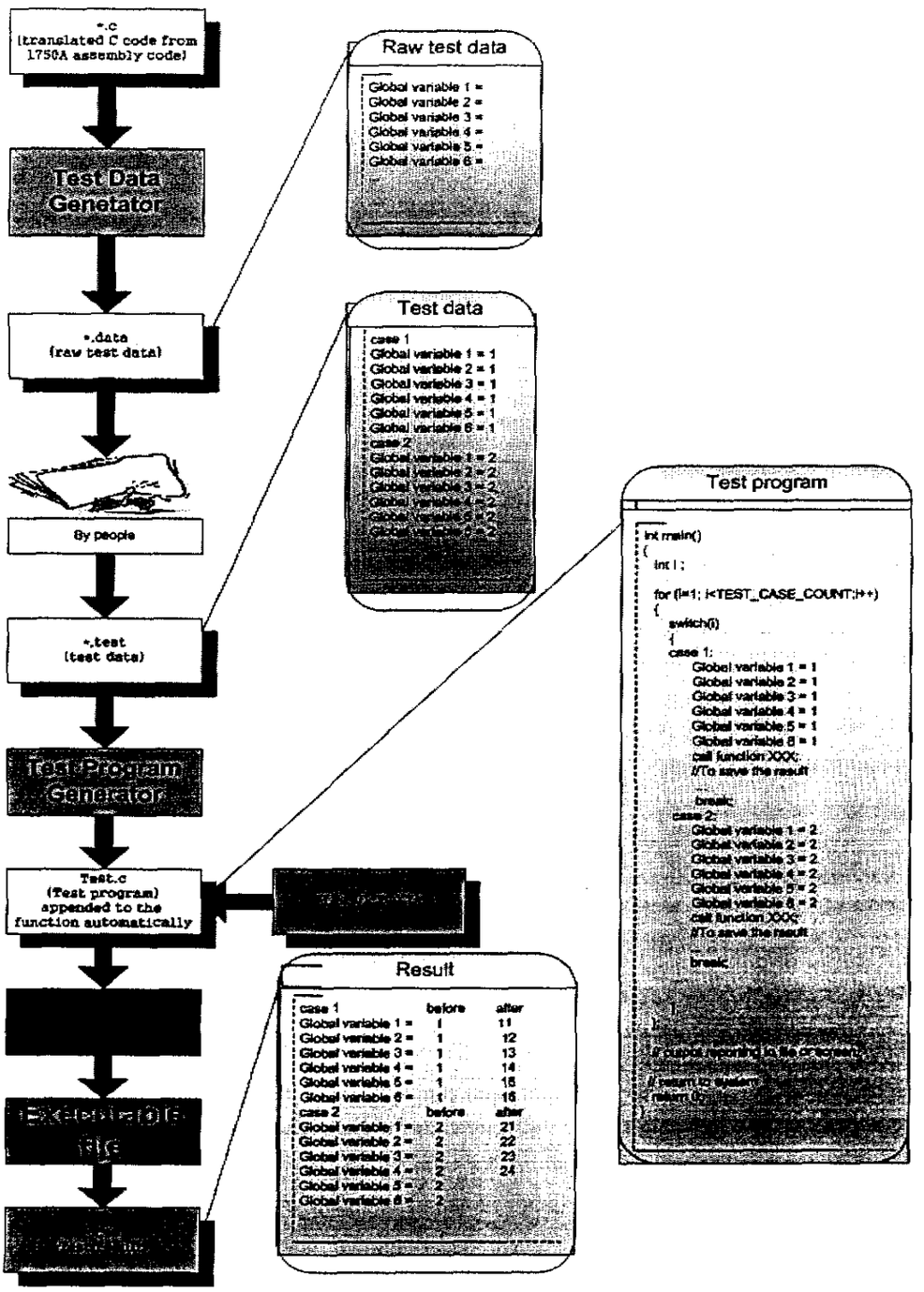
Fig. 4 開發人員的權限控管介面.

總結: Mantis 是一套易學易用並符合我們 CC 專案需求的 Bug tacking system. 藉由我們使用的心得, 希望未來的開發環境能夠正式導入一套這樣的系統.

2.6. Test data and program generator

模組測試的構想

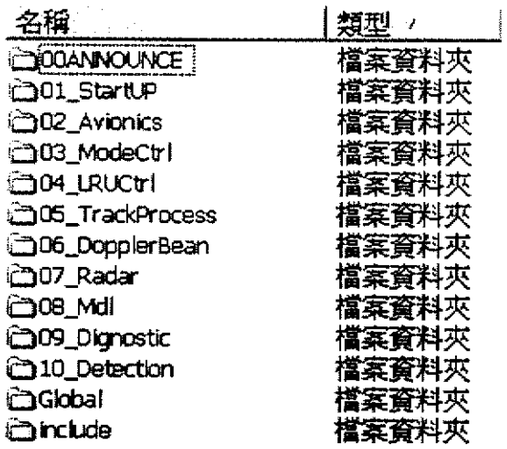
在每個模組中 加上一個 main 函數，這個 main 函數可以輸入適當的變數值後，呼叫該測試模組，並印出結果相互比較。構想如下圖所示：



圖中兩個橙色的方塊，分別是 TDG(Test Data Generator)與 TPG（Test Program Generator）。TDG 是幫我們在受測模組的檔案中，找出所用到的 global variables，減少人力的負擔。TDG 所產生的資料，只是一些 global variable 的列表，接著由測試者填入 test case 的各項值，這些值被存在附檔名為*.test 的檔案中。TPG 會把*.test 的資料讀入，根據這些資料，產生用來測試該模組的 main 函數，並且把它加在該模組所在的檔案後面。接著經由設定適當的編譯指令，便可以把該模組編譯成可執行檔，執行成功後，會得到各個變數的變動情況，再由測試者加以判斷。在這樣的流程中，測試者只須把 TDG 所產生的資料檔加以編輯，便可以得到 test case，然後之後的動作就交給 TPG 與 gcc，這樣做可以提高效率，並且讓測試者可以專注在資料的觀察上，而不必為了其它測試的細節而受到干擾。

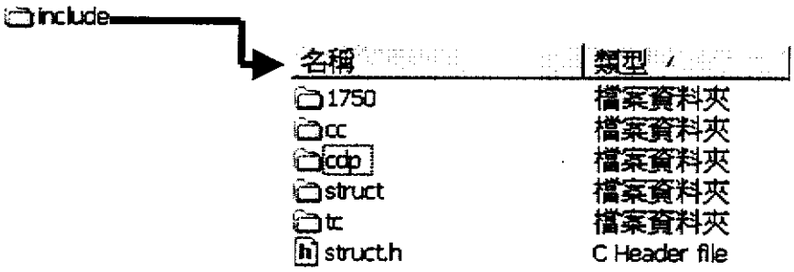
2.7. 翻譯成為 c 語言的程式架構

CC（Control Computer）所屬檔案共有 322 個，可分類成為 11 個大類，其中 1 個大類為整體變數，其餘 10 大類則為組成 CC 的各個模組。目錄結構如下圖所示：



名稱	類型
00ANNOUNCE	檔案資料夾
01_StartUP	檔案資料夾
02_Avionics	檔案資料夾
03_ModeCtrl	檔案資料夾
04_LRUCtrl	檔案資料夾
05_TrackProcess	檔案資料夾
06_DopplerBean	檔案資料夾
07_Radar	檔案資料夾
08_Mdl	檔案資料夾
09_Dignostic	檔案資料夾
10_Detection	檔案資料夾
Global	檔案資料夾
include	檔案資料夾

編號 01 到 10 的目錄分別是 10 大類的模組，而 Global 的目錄則為整體變數的目錄，不過由於 CC 會引用到如 1750、TC（Track Computer）等等的整體變數與型別定義，為了整個專案的完整性[1]，因此把原來的 Global 的部分，搬動到 include 的 CC 目錄中，因此在 include 中會看到下列的目錄結構，



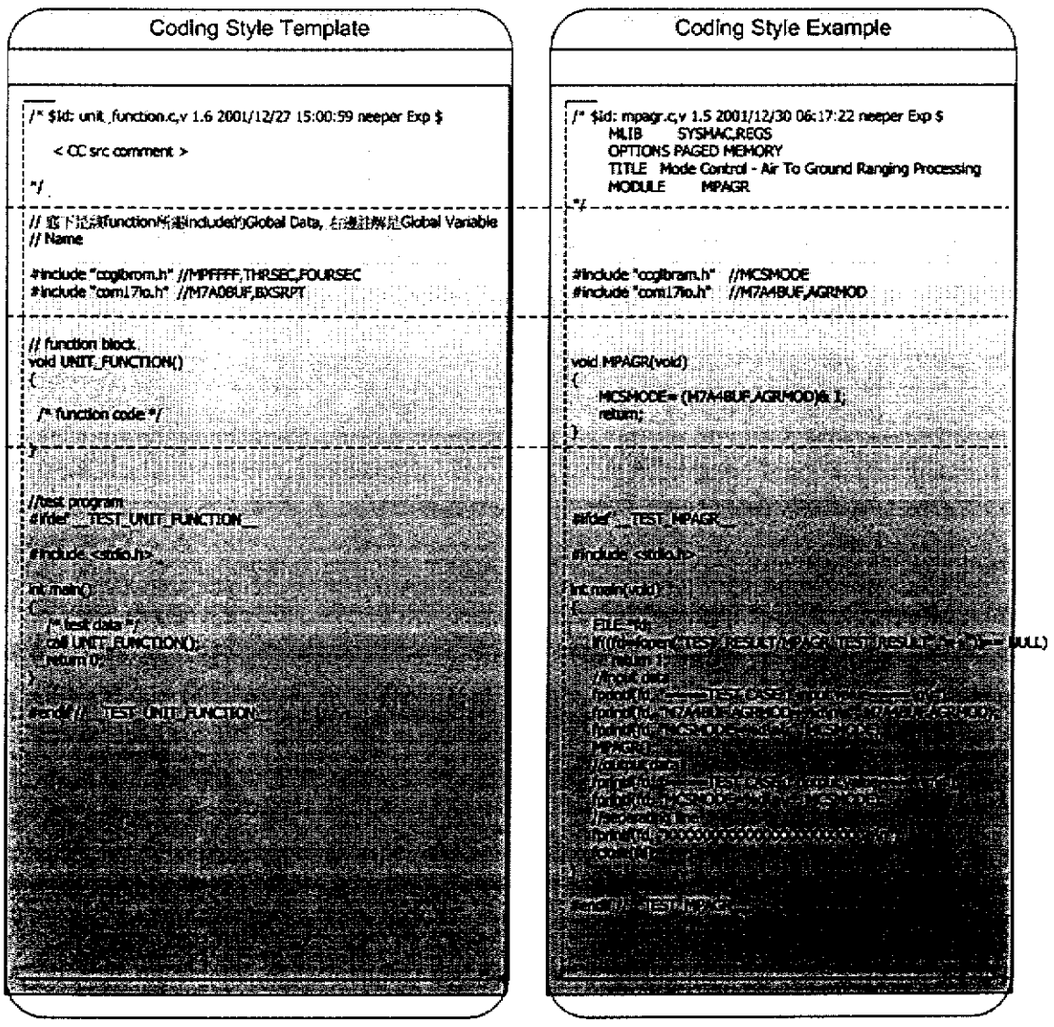
include

名稱	類型
1750	檔案資料夾
cc	檔案資料夾
cdp	檔案資料夾
struct	檔案資料夾
tc	檔案資料夾
struct.h	C Header file

在 include 這個目錄下，置放 1750、CC、TC、CDP 所定義的整體變數以及相關的型別定義等等。

[1] 採用這樣方式的原由是因為在翻譯 CC 的過程，引用 1750 的整體變數，竟然也會把 TC 的整體變數引入，追查原因發現當初 TC 翻譯時，把他們所需的相關檔案直接加在 1750 中，那時候只有 TC 自己使用所以沒有發現問題，如今，CC 也需要 1750，結果一引入，就把 TC 的部分也引入了。為了避免日後發生相同的問題，我們花了不少時間修正 1750 的問題，並把這個部分整理成 include 這個目錄。

下圖示每個模組檔案的 coding style。左圖代表每個模組會分成四大部分：檔頭註解、整體變數引入、模組函數以及測試用 main 函數。右圖則是一個實際上的例子。



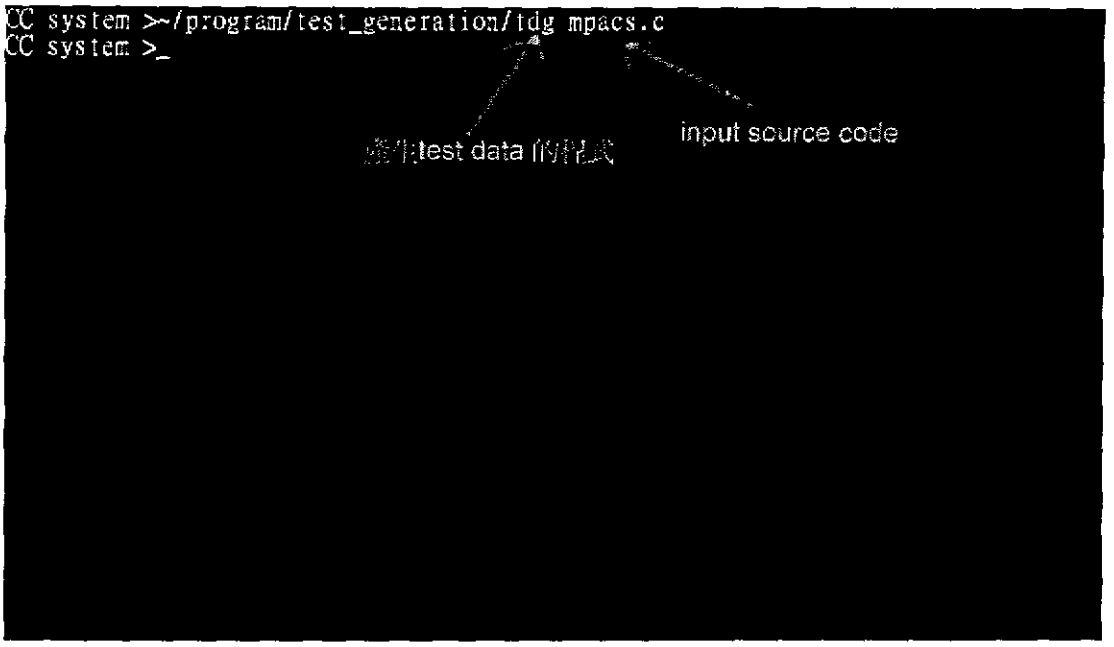
3. 測試驗證

3.1. 程式模組測試方法

我們把翻譯好的模組測試，分成兩階段來測試。
第一階段：使用 c 編譯器做語法測試。
第二階段：配合測試工具，對模組與整體資料的語意測試，以及邏輯測試。

3.2. 程式模組測試狀況

1 執行 TDG (Test Data Generator)從*.c 找出所使用的整體變數。



2 從所得到的*.data 中修改成為*.test (完整的測試資料檔案) [手動] 。

```
case 1
            MPTIMER1 = 3;
              ACMTIM = 1;
             MCSMODE = 0;
               ACMCHK = 0;
               TCTRKM = 3;
            MPACVTIM = 0;
            ANTFORCE = 0;
             M7A0BUF.AQSTAT =3 ;
             MPACS();
case 2
            MPTIMER1 = 3;
              ACMTIM = 1;
             MCSMODE = 0;
               ACMCHK = 0;
               TCTRKM = 3;
            MPACVTIM = 0;
            ANTFORCE = 0;
             M7A0BUF.AQSTAT =11 ;
             MPACS();
~
~
~
                                                          1,6           All
```

3 把要被測試的檔案*.c 與相對應的測試資料檔案*.test 輸入給 TPG(Test Program Generator) ，得到最後的測試檔案。

```
CC system >~/program/test_generation/tpg mpacs.c.data mpacs.c
Job finished.
CC system >_
```

4 輸入適當的編譯指令，把要被測試的檔案*.c 編譯成可執行檔。

```
          test flag
CC system >make TEST=MPACS mpacs
gcc -D__TEST_MPACS__ -I../include -I../include/1750 -I../include/cdp -I../includ
e/cc -I../include/struct -L../lib -l1750 -g    mpacs.c    -o mpacs
CC system >_
```

5 執行該檔案得到輸出的結果。

```
CC system >./mpacs
case 0                          before      after           ok?      comment
MPTIMER1              =          3          -1
ACMTIM                =          1          -1
MCSMODE               =          0           2
ACMCHK                =          0           0
CCTRKM                =          3           1
MPACVTIM              =          0           0
ANTFORCE              =          0          32
M7A0BUF.AQSTAT        =          3          -1
--------------------------------------------------------------------------------
case 1                          before      after           ok?      comment
MPTIMER1              =          3           3
ACMTIM                =          1           1
MCSMODE               =          0           0
ACMCHK                =          0           0
CCTRKM                =          3           3
MPACVTIM              =          0           0
ANTFORCE              =          0           0
M7A0BUF.AQSTAT        =         11          11
--------------------------------------------------------------------------------
CC system >_
```

3.3. 程式模組測試結果

Global data 與 ModeCrtl 模組的翻譯，ModeCrtl 共有 73 個檔案。
通過語法測試：73 個。
通過模組與整體資料的語意測試：63 個。

【CC Module 3 File List　2001/12/28】

File Name	Status	File Name	Status
acmtsk.c	link error, about 1750.	mpdbsf.c	可以執行!
agrstby.c	link ok!! 可以 run!!	mpdbsin.c	可以執行!
autorng.c	link ok!! 可以 run!!	mpdbslw.c	link ok!! 可以 run!!
bcpical.c	link ok!!, 可以 run!!	mpdbsp.c	有 call 其他 function.
calcload.c	link ok!! 可以 run!!	mpdflt.c	link ok!!, dummy func.
mcmdcntl.c	編譯成功, no warning!	mpdlsp.c	link ok!! 可以 run!!
mcrngscl.c	link ok!! 可以 run!!	mpinit.c	尚有問題!
mctwsrng.c	link ok!! 可以 run!!	mpldbs.c	link ok!! 可以 run!!
mpacbs.c	link ok!! 可以 run!!	mplds.c	link ok!! 可以 run!!
mpacp.c	link ok!! 可以 run!!	mpldv.c	link ok, dummy func.
mpacs.c	run ok!!	mplubs.c	run ok!!
mpacv.c	link ok!!, dummy func.	mplus.c	加上 void 宣告
mpadlbs.c	link ok!! 可以 run!!	mpluv.c	link ok!! dummy func.
mpadls.c	link ok!!, dummy func.	mpmapf.c	link ok!! 可以 run!!
mpadlsp.c	link ok!! 可以 run!!	mpmapn.c	link ok!! 可以 run!!
mpadlv.c	link ok!! dummy func.	mpmapx.c	link ok!! 可以 run!!
mpagr.c	link ok!! 可以 run!!	mpmapxf.c	link ok!! 可以 run!!
mpasmrng.c	link ok!! 可以 run!!	mpmddet.c	case error!
mpaulbs.c	link ok!! 可以 run!!	mpmtigmf.c	link ok!! 可以 run!!
mpauls.c	link ok!! dummy func.	mpmtimap.c	link ok!! 可以 run!!
mpaulsp.c	link ok!! 可以 run!!	mpmtimvr.c	link ok!! 可以 run!!
mpaulv.c	link ok!!, dummy func.	mpnorm.c	尚有問題!
mpbit.c	link ok!! 可以 run!!	mpsas.c	link ok!! 可以 run!!
mpckantb.c	完成 TEST CASE	mpseaf.c	link ok!! 可以 run!!
mpckantp.c	新的 ccglbrom.h	mpsean.c	link ok!! 可以 run!!
mpdbsa.c	link ok!! 可以 run!!	mpsmttbs.c	link ok!! 可以 run!!

mpsmttc.c	link ok!! 可以 run!!	mpterm.c	翻成 C，有些 if 並不是很確定，要小心
mpsmttir.c	link ok!! 可以 run!!		
mpsmttit.c	加上 void 宣告	mptrans.c	編譯完成
mpsmttut.c	link ok!! 可以 run!!	mptwss.c	link ok!! dummy func.
mpsmttv.c	link ok!! 可以 run!!	mpulsp.c	加上 void 宣告
mpstat.c	link ok!! 可以 run!!	mpvsms.c	link ok!! 可以 run!!
mpstby.c	加上 void 宣告	mpvsp.c	link ok!! 可以 run!!
mpstrr.c	link ok!! 可以 run!!	mpvss.c	link ok!! 可以 run!!
mpsttc.c	link ok!! 可以 run!!	mpvsv.c	link ok!! dummy func.
mpsttir.c	link ok!! 可以 run!!	mtrinit.c	link ok!! 可以 run!!
mpsttit.c	修正 header 資訊完成。		
mpsttut.c	修正 header 資訊完成。		

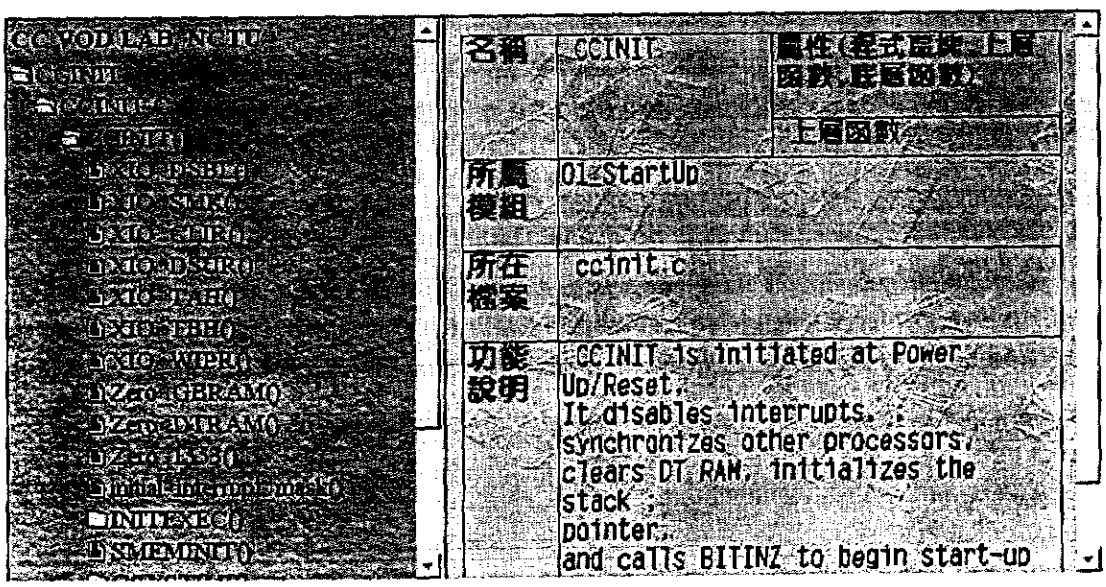
==========

共 73 files (Functions)

4. 附錄

4.1. 附錄一 初始化模組（01_Startup）的追蹤結果

追蹤的結果是用 HTML 的方式紀錄，請參見所附光碟中的 CCTree.htm。此處僅附上部分結果。



4.2. 附錄二 03_ModeCtrl 的 call tree

```
CC_tree
        03_MCMDCNTL
                01_FXERRPT()
                        01_PUTLINC()
                02_RSYSTIM()
                03_RPTERR()
                        01_FTMSGHDR()
                        02_FMXMTSWP()
                04_GTIMR0()
                05_ERRPROC()
                        01_FXERRPT()
                                01_PUTLINC()
                        02_RPTERR()
                                01_FTMSGHDR()
                                02_FMXMTSWP()
                06_MPINT()
                        01_AGRSTBY()
                07_MPDFLT()
                        01_MTRINIT()
                08_MPMDDET()
                        01_DBSVALID()
                09_MPNORM()
                        01_TCACQ()
                                01_SMOUTP()
                                        01_SMOUTPI()
                                                01_ERRPROC()
                                                02_RELBUFI()
                                                03_ENQUEUEI()
                                                02_MTRINIT()
                10_MCTWSRNG()
                11_MCRNGSCL()
                12_AUTORNG()
                13_MPTRANS()
                        01_MTRINIT()
                        02_MPAGR()
                        03_MPDBSLW()
                                01_DBSLEWP()
                                02_MPCKANTP()
                        04_MPDBSIN()
                        05_MPDBSA()
                        06_MPDBSP()
                                01_DBSPAUSP()
                                02_STCMD()
                        07_MPDBSF()
                        08_MPMAPX()
                        09_MPMAPXF()
                        10_MPMAPN()
                        11_MPMAPF()
                        12_MPMTIMVR()
```

13_MPMTIMAP( )
14_MPMTIGMF( )
15_MPSEAN( )
16_MPSMTTV( )
17_MPSMTTBS( )
18_MPSMTTIR( )
19_MPSMTTIT( )
20_MPSMTTUT( )
21_MPSMTTC( )
22_MPLUS( )
23_MPULSP( )
24_MPLUV( )
    01_MPCKANTP( )
25_MPLUBS( )
26_MPLDS( )
27_MPDLSP( )
28_MPLDV( )
    01_MPCKANTP( )
29_MPLDBS( )
30_MPACS( )
    01_LRUANTM( )
31_MPACP( )
32_MPACV( )
    01_LRUANTM( )
    02_LRUMAN( )
    03_MPCKANTP( )
    04_MPCKANTB( )
33_MPACBS( )
34_MPAULS( )
    01_MPASMRNG( )
35_MPAULSP( )
36_MPAULBS( )
37_MPAULV( )
    01_MPCKANTP( )
38_MPADLS( )
    01_MPASMRNG( )
39_MPADLSP( )
40_MPADLV( )
    01_MPCKANTP( )
41_MPADLBS( )
42_MPADLSP( )
43_MPADLS( )
44_MPADLV( )
45_MPADLBS( )
46_MPSTTIR( )
47_MPSTTIT( )
48_MPSTTUT( )
49_MPSTTC( )
50_MPSAS( )
51_MPSTAT( )
52_MPSTRR( )
53_MPSTBY( )
54_MPBIT( )

```
                01_BITINZ()
        55_MPVSS()
        56_MPVSP()
        57_MPVSV()
                01_MPCKANTP()
        58_MPVSMS()
        59_MPTWSS()
                01_MPCKANTP()
                02_TWSMAINT()
14_SINCOS()
15_MPTERM()
        01_GSYSTIM()
                01_GSYSTIMI()
                        01_GTIMR2()
        02_STTIME()
                01_GSYSTIM()
                        01_GSYSTIMI()
                                01_GTIMR2()
        03_BCPICAL()
        04_GETTCB()
                01_GETTCBI()
        05_SKED()
                01_SKEDI()
        06_GTIMR2()
        07_WAIT()
                01_WAITI()
16_TWSMAINT()
17_CALCLOAD()
18_RELTCB()
        01_RELTCBI()
                01_ERRPROC()
19_RSYSTIM()
        01_GSYSTIMI()
20_GTIMR0()
21_WAIT()
        01_WAITI()
```

4.3. 附錄三 03_ModeCtrl 程式分支複雜度統計

L	檔名	IF 個數	最深層數	WHILE 數	switch 數	合計
1	mpagr.c	0	0	0	0	0
1	mpbit.c	0	0	0	0	0
2	mpdflt.c	0	0	0	0	0
1	mpstby.c	0	0	0	0	0
1	mpacs.c	1	1	0	0	1
1	mpckantb.c	1	1	0	0	1
1	mpckantp.c	1	1	0	0	1
1	mpdbsf.c	1	1	0	0	1
1	mpdbsin.c	1	1	0	0	1
1	mpmapf.c	1	1	0	0	1
1	mpmapn.c	1	1	0	0	1
1	mpmapx.c	1	1	0	0	1
1	mpmapxf.c	1	1	0	0	1
1	mpmtigmf.c	1	1	0	0	1
1	mpseaf.c	1	1	0	0	1
1	mpsean.c	1	1	0	0	1
1	acmtsk.c	2	1	0	0	2
1	calcload.c	2	2	0	0	2
1	mpdbsa.c	2	1	0	0	2
2	mpdbslw.c	2	2	0	0	2
1	bcpical.c	3	1	0	0	3
1	mpacbs.c	3	1	0	0	3
1	mpadlbs.c	3	1	0	0	3
1	mpaulbs.c	3	1	0	0	3
1	mplubs.c	3	1	0	0	3
1	mpvsms.c	3	1	0	0	3
1	mtrinit.c	2	2	1	0	3
1	mpdbsp.c	4	3	0	0	4
1	mpmtimap.c	4	2	0	0	4
1	mpmtimvr.c	4	2	0	0	4
1	mpsmttc.c	4	1	0	0	4
1	mpsmttir.c	4	1	0	0	4
1	mpsmttut.c	4	1	0	0	4
1	agrstby.c	5	4	0	0	5
1	mpacp.c	5	3	0	0	5
1	mpadlsp.c	5	4	0	0	5
1	mpaulsp.c	5	4	0	0	5
1	mpdlsp.c	5	4	0	0	5
1	mplds.c	5	3	0	0	5
1	mplus.c	5	3	0	0	5
1	mpsmttv.c	5	2	0	0	5
1	mpulsp.c	5	4	0	0	5
1	mpvsp.c	5	4	0	0	5
1	mpvss.c	5	3	0	0	5
1	autorng.c	4	2	3	0	7
1	mcrngscl.c	6	1	0	4	7
1	mctwsrng.c	6	1	0	4	7
2	mpadls.c	7	3	0	0	7

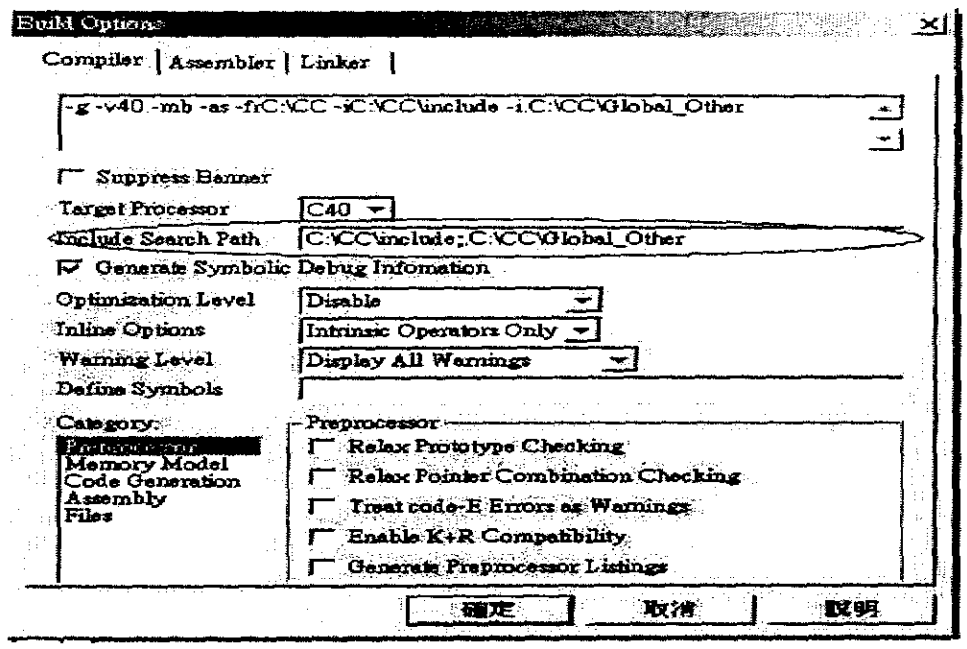
2	mpauls.c	7	3	0	0	7
1	mpldbs.c	7	3	0	0	7
1	mpsmttit.c	7	2	0	0	7
1	mpsmttbs.c	8	4	0	0	8
2	mpadlv.c	9	4	0	0	9
2	mpaulv.c	9	4	0	0	9
2	mpldv.c	9	4	0	0	9
2	mpluv.c	9	4	0	0	9
2	mpnorm.c	9	2	0	0	9
2	mpvsv.c	9	4	0	0	9
1	mpsttir.c	10	4	0	0	10
2	mptrans.c	11	3	0	0	11
2	mpacv.c	12	5	0	0	12
1	mpsttc.c	13	4	0	0	13
2	mpinit.c	14	3	0	0	14
1	mpsttut.c	15	4	0	0	15
1	mpsttit.c	16	5	0	0	16
1	mpmddet.c	16	3	0	9	17
1	mpsas.c	18	4	0	0	18
2	mptwss.c	18	4	0	0	18
1	mpasmrng.c	18	2	0	4	19
1	mpstrr.c	21	6	0	0	21
3	mcmdcntl.c	23	3	0	0	23
1	mpstat.c	25	5	0	0	25
2	mpterm.c	30	3	1	0	31

L 表示呼叫的層數，L=1 表示為底層函數，L=2 表示呼叫一次底層函數，L=3 則表示呼叫 L=2 的函數，以此類推。

4.4. 附錄四 CC Simulator 環境設定

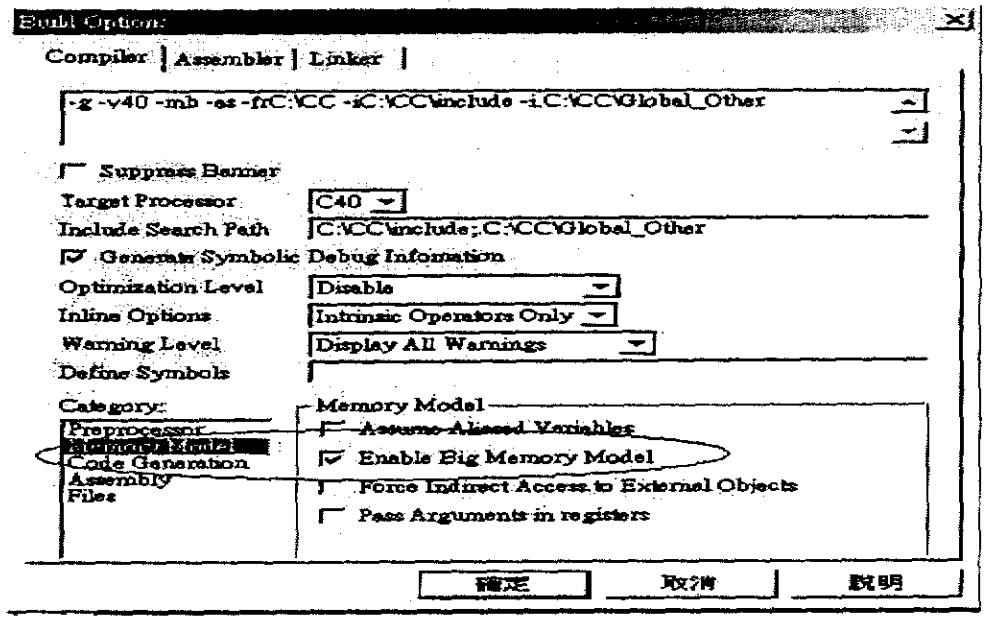
CC 所使用的模擬器是德儀 TI TMS320C4x CPU 的模擬器。

Step 1. 設定 include 檔路徑，讓 compiler 可以找到適當的 include 檔，建議採絕對路徑方式，以免當 source tree 不只一層時會出錯。



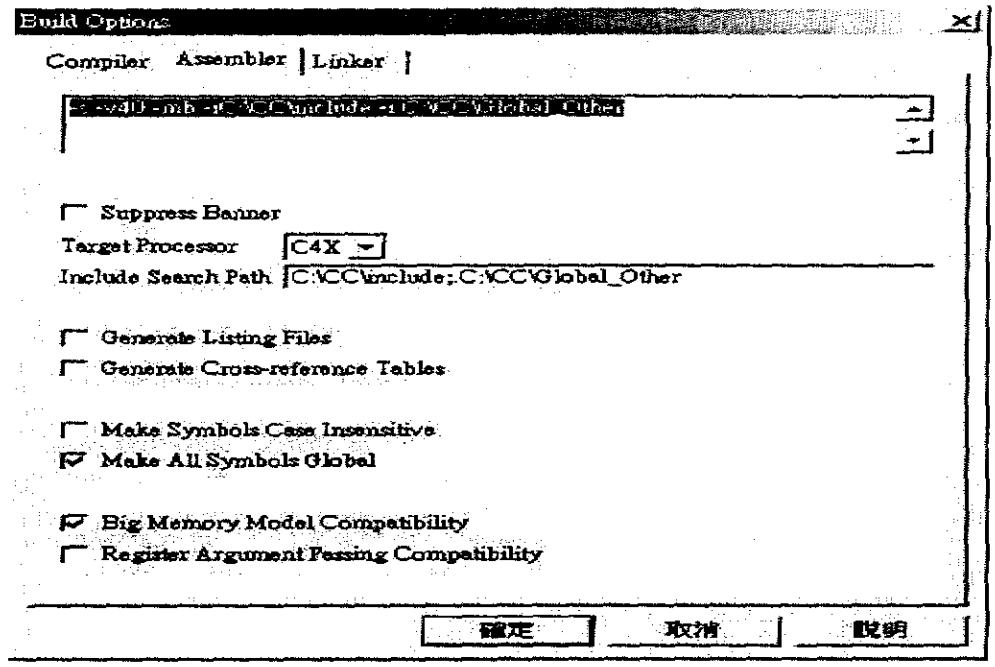
圖一. 設定 include 檔路徑。

Step 2. 設定記憶體模式，在 Compiler 這個 sheet 下，Category 有個 Memory Model，將 Enable Big Memory Model 選項打勾，如圖二所示。



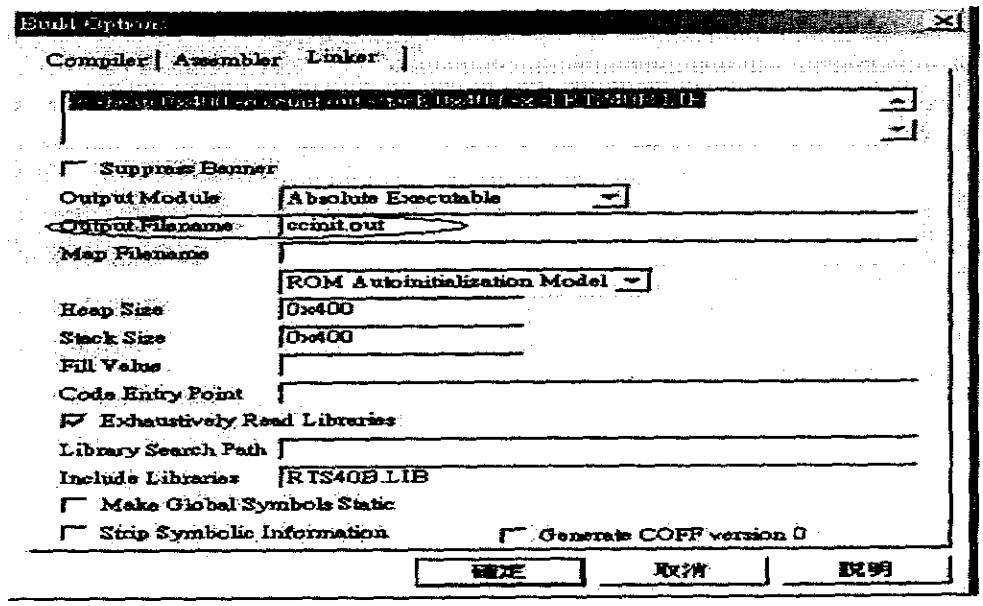
圖二. 設定記憶體模式。

Step 3. 接下是 **Assembler** 的設定，跟上面兩個步驟相同，Include 檔路徑，記憶體模式。



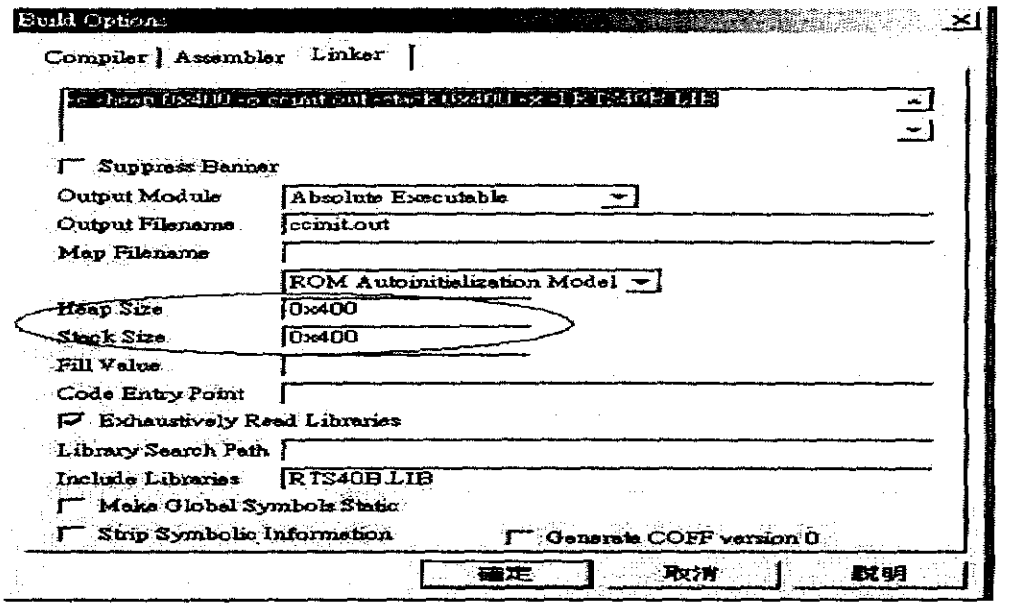
圖三. Assembler 相關設定。

Step 4. Linker 產生 OBJ 檔名設定，Simulator OBJ 預設附檔名為 .out。



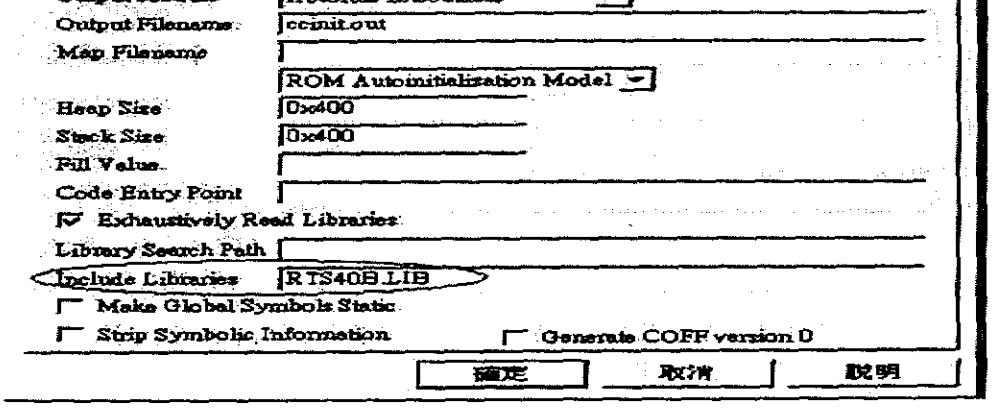
圖四. Linker OBJ 輸出檔名設定。

Step 5. Linker 的 Heap/Stack Size 設定，Heap/Stack size 均為 0x400。



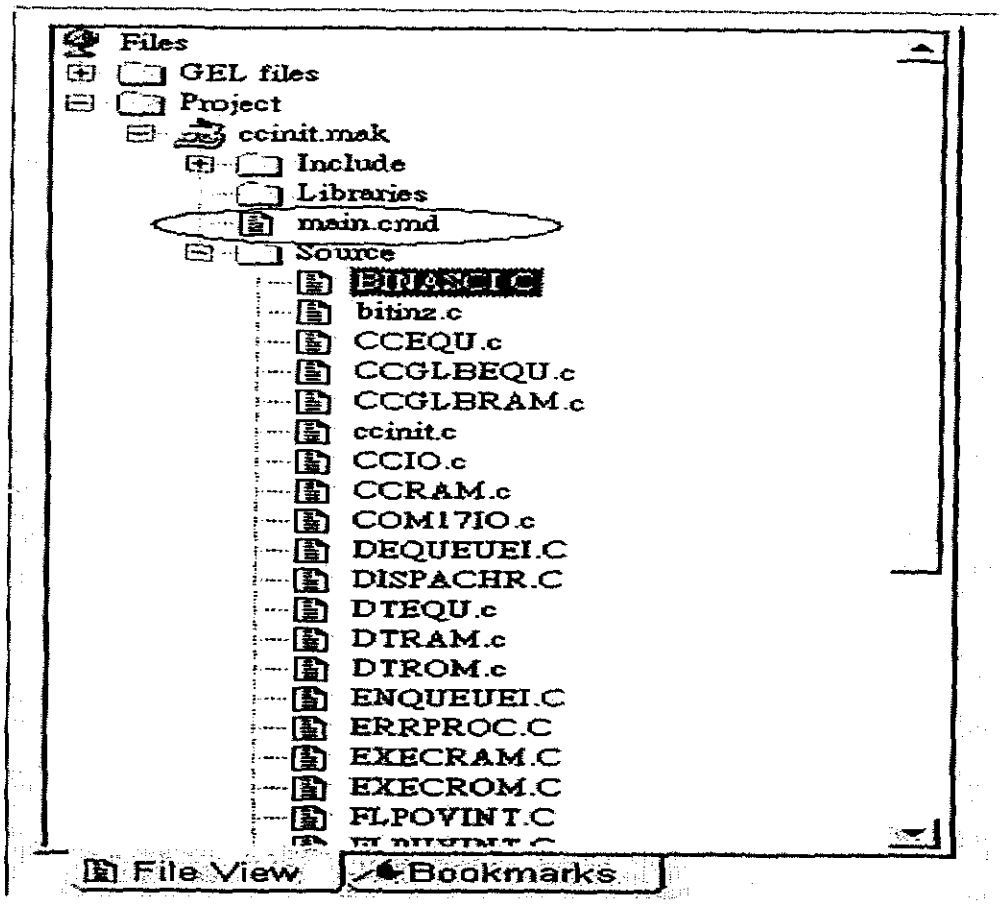
圖五. Heap/Stack 大小設定。

Step 6. Include Library 設定，我們的 CC 需要一個 RTS40B.LIB 這個靜態的函式庫，而這個 RTS40B.LIB 好像原本的 simulator 沒有，必須另行準備，並放置 simulator 安裝目錄下的 lib/目錄。



圖六. Library 設定。

Step 7. 額外加入一個 main.cmd 檔，如下圖：



完成以上步驟後，我們的 CC Simulator 環境大致設定完成。

接下來就可在 Simulator 上面跑我們的程式。

4.5. 附錄五 版本控管系統（cvs）使用說明

譯者: myhsu
作者: Ben Fennema
出處: http://www.csc.calpoly.edu/~dbutler/tutorials/winter96/cvs/

CVS 是OpenSource 軟體開發的重要工具，用於程式版本的控制。閱讀完此文件後，希望能夠讓你學會如何安裝CVS、如何將專案放入CVS 中進行版本控管、基本的CVS 用法以及了解分支(Branching) 的功能及其用途。

前言
本文件譯自Ben Fennema 先生寫的CVS Tutorial，原文刊載於 http://www.csc.calpoly.edu/~dbutler/tutorials/winter96/cvs/。經取得原作者授權及同意，譯成中文，並加入譯者部份的增修。
本篇主要譯者為cyko(柯志裕)，myhsu 進行潤飾與細部修正。

目的
閱讀完此文件後，希望能夠讓你學會以下幾個主題：
1. 如何安裝CVS
2. 如何將專案放入CVS 中進行版本控管
3. 基本的CVS 用法
5. 了解分支(Branching) 的功能及其用途

觀念
CVS(Concurrent Version System) 是一種程式原始碼的版本控制系統，用來記錄程式原始碼的變化歷程。Bug (程式臭蟲) 常在程式修改時產生，但可能在修改之後很長一段時間問題才被發現，利用CVS 你可以取出舊版程式碼，以找出是在那一次改版時產生這個bug。在多人處理同一專案時，很容易發生覆蓋掉別人程式碼的情形。遇到這種困擾， CVS 也是有極大幫助的。為了解決這個問題，CVS 讓每個人在自己的目錄下進行程式的修改，當工作完成後，再經由CVS 進行合併(merge) 的工作。CVS 檔案是採用RCS 的格式儲存。如果想進一步了解RCS 檔案格式請參閱RCS tutorial。

說明
接下來的內容中，所有的CVS 命令以粗體或方塊顯示：cvs commit bob.c 輸出結果以方塊顯示：

準備好使用CVS
首先設定CVSROOT 這個環境變數到你想要使用的CVS 存放目錄，以sh/ksh/bash為例
若為csh/tcsh 的環境，則為
CVSROOT=~/cvsroot;export CVSROOT (於本機建立CVS Server)
setenv CVSROOT ~/cvsroot;export CVSROOT
或是透過網路遠端存取已經設定好的CVS 伺服器，
pserver 是CVS 伺服器採用的使用者認證方法之一(尚有其他種類)。john 是在機器上的帳號名稱。cvs.foo.bar
是表示已經安裝及設定好的CVS 伺服器。/var/cvsroot 是CVS 伺服器上供存取CVS 檔案的目錄。
(欲使用網路上的CVS 伺服器者可以跳至下一頁)。要確定你用CVSROOT 指定的目錄已經建立好了，接著執行這個命令會在環境變數CVSROOT 所指定的目錄(~/cvsroot 或是cvs.foo.bar 上的/var/cvsroot) 下建立一個CVSROOT 子目錄，並在其中放入一些CVS 系統必要的檔案。

如何將專案放入CVS 中進行版本控管
假設在/class/bfennema/project 下有一個由許多檔案所組成的程式，要把這個程式放入CVS 開始進行版本控管，首先執行接著執行-m 之後是表示此次動作的訊息記錄，project 為專案名稱，vendor 為廠商註記，start 為版本註記。CVS 會把目前目錄下的東西(含子目錄) 通通都放到CVS 中。CVS 會回應
如果這些程式是你自己的，現在可以把原本的原始碼刪除(即完全以CVS 系統中的檔案為主)，在刪除之前先把舊的原始碼備份起來是個好習慣。

基本的CVS 用法
現在你的原始碼已經安全的存放在CVS 的倉庫(repository) 中了， 想要取出你的原始碼，先切換至你的家目錄，輸入CVS會回應：
這個動作會在你現在所在的目錄下，以專案的名稱建立一個目錄，並將所有檔案放在其中，另外在專案的目錄中會有一個CVS 目錄，裡面存放有關這些檔案的資訊。現在你可以開始對這些原始檔案作修改，比如說，你在main.c 中呼叫bar()之後加了printf("DONE\n");

```
CVSROOT=:pserver:john@cvs.foo.bar:/var/cvsroot
export CVSROOT (使用網路上的CVS Server)
cvs init
cd /class/bfennema/project
cvs import -m "Sample Program" project vendor start
N project/Makefile
N project/main.c
```

N project/bar.c
N project/foo.c
No conflicts created by this import
cd
cvs checkout project
cvs checkout: Updating project
U project/Makefile
U project/bar.c
U project/foo.c
U project/main.c
在你要將新的程式碼存回(check in)
CVS會回應
注意，-m 選項讓你在命令列直接輸入修改訊息，如果你忽略這個選項， 你會被帶到編輯器中，在那裡輸入修改訊息。

多人使用CVS
要模擬多人使用的狀況，首先以第二位開發者的身份再建立一個目錄(devel2)，取出project(cvs checkout
project)。接著進入devel2/project 的目錄中，在bar.c 中的printf("BAR\n"); 後加上printf("YOU\n"); 接著以第二位開發人員的角色作check in bar.c 的動作(也就是cvs commit -m ``Added a YOU'' bar.c)。
現在以第一位開發者的身份回到第一個目錄(假設是devel1)，觀察bar.c，你可以看到在devel2 下所作的修改並未影響到第一位開發者的版本，這時候第一位開發者必需執行
CVS會回應：
U bar.c
現在再看看bar.c ，devel1 看起來應該和devel2 的版本一致了。
接著以第一位開發者身份在devel1/project 下編輯foo.c，在printf("FOO\n"); 之後加上printf("YOU\n");對第一位開發者的foo.c 作check in (也就是cvs commit -m ``Added YOU'' foo.c)。再回到第二位開發者的devel2/project 下，在printf("FOO\n"); 後加上printf("TOO\n");接著輸入
CVS會回應：
cvs status foo.c
一個檔案的status (狀態) 可能是：
    Up-to-date：表示檔案和倉庫中的最新版相同。
    Locally Modified：表示你已經對檔案作修改，但尚未作check in。
    Needing Patch：表示有人已經放入新版本到倉庫中。
cvs commit -m "Added a DONE message." main.c

```
Checking in main.c:
/class/'username'/cvsroot/project/main.c,v < - main.c
new revision: 1.2; previous revision: 1.1
done
cvs update bar.c
U bar.c
cvs status foo.c
===================================================
File: foo.c Status: Needs Merge
Working revision: 1.1.1.1 'Some Date'
Repository revision: 1.2 /class/'username'/cvsroot/project/foo.c,v
Sticky Tag: (none)
Sticky Date: (none)
Sticky Options: (none)
```

Needs Merge：表示有人已經放入新版本到倉庫中，而你也對自己目錄下的檔案作過修改。目前的status 是Need Merge 表示我們需要合併(merge) 第一位開發者所作的改變，輸入：

```
cvs update foo.c
```

CVS會回應：

```
RCS file: /class/'username'/cvsroot/project/foo.c,v
retrieving revision 1.1.1.1
retrieving revision 1.2
Merging differences between 1.1.1.1 and 1.2 into foo.c
rcsmerge: warning: conflicts during merge
cvs update: conflicts found in foo.c
C foo.c
```

因為我們對(devel1, devel2) 所作的改變具有關連性(位置相同)，所以我們必須手動調整foo.c，把他改成我們希望的樣子，先看一下foo.c：
可以看到devel1 所加的文字是介於======= 和>>>>>>> 1.2. 間，而在devel2 加入的文字是介於======= 和<<<<<<< foo.c 間，要解決這個問題，把 printf("TOO\n") 移到printf("YOU\n") 之後，再把CVS 插入的內容殺掉，接著將foo.c 作check in，由於你使用了cvs update 命令，並且針對devel1 所作的修改作了整合，所以整合的結果就被放回了倉庫。

CVS 的分支

對一個產品維護多個版本時，CVS 有一個非常有用的特性，就是在revision tree中能夠產生分支。CVS有一個tag 命令讓你指定一個名字給特定版本的檔案，cvs status 的-v 選項讓你可以看到檔案的tag。

回到我們的例子，到devel1 的目錄，執行以取得foo.c 目前的版本接著，我們想要發行這個產品的第一版，我們希望以release-1 來標記(tag) 所有檔案CVS會回應

```
cvs update foo.c
RCS file: /class/`username`/cvsroot/project/foo.c,v
retrieving revision 1.1.1.1
retrieving revision 1.2
Merging differences between 1.1.1.1 and 1.2 into foo.c
rcsmerge: warning: conflicts during merge
cvs update: conflicts found in foo.c
C foo.c
void foo()
{
printf("FOO\n");
<<<<<<< foo.c
printf("TOO\n");
=======
printf("YOU\n");
>>>>>>> 1.2
}
cvs update foo.c
cvs tag release-1 .
cvs tag: Tagging .
T Makefile
T bar.c
```

如果有其他的發展者想要取出release-1，他要輸入：

他會得到release-1 版本而不是最新的版本（如果有的話）

現在我們已經有了一個release 版本，讓我們假裝我們開始第二版的工作，我們知道顧客在抱怨第一版的一個嚴重錯誤，而第二版要在幾個月後才會完成，但是第一版的這個錯誤應該在現在就要解決。

現在呢，我們先把之前課程中的兩個發展樹移除掉，在CVS中有個簡單的方法可以作到，先換到你專案所在的目錄，執行-d 的選項告訴CVS 把這份拷貝殺掉CVS會回應：

```
You have [0] altered files in this repository.
Are you sure you want to release (and delete) odule `project':
```

回答：

```
y
```

用同樣的命令把devel2 殺掉
現在我們要產生版本1 的分支，回到原始的目錄，執行CVS會回應：

```
cvs rtag: Tagging project
```

其次我們需要取出剛建立的分支：

```
cvs checkout -r release-1-patches project
```

CVS會回應：

```
cvs checkout: Updating project
U project/Makefile
U project/bar.c
U project/foo.c
U project/main.c
```

現在你可以修改版本1 的bug，所有更改後的check in 動作會把檔案放在分支中，而不是原來的主幹中，假設bug 的修正是將印出YOU 和TOO 的敘述互換，將foot.c 作check in，你也可以把分支再組合回主幹中，要這樣作，首先把修改版刪掉
接著用-j 選項把release-1 和release-1-patches 組合起來
CVS會回應：

```
T foo.c
T main.c
cvs checkout -r release-1 project
cvs release -d project
You have [0] altered files in this repository.
Are you sure you want to release (and delete) odule `project':
y
cvs rtag -b -r release-1 release-1-patches project
cvs rtag: Tagging project
cvs checkout -r release-1-patches project
cvs checkout: Updating project
U project/Makefile
```

```
U project/bar.c
U project/foo.c
U project/main.c
cd ..
cvs release -d project
cvs checkout -j release-1-patches project
cvs checkout: Updating project
U project/Makefile
U project/bar.c
U project/foo.c
RCS file: /class/'username'/cvsroot/project/foo.c,v
```

如果合併過程中有任何衝突(conflict) 發生，將會需要手動修正，完成之後你可以把和release-1-patch 組合後的所有檔案放入目前的source tree。

其它CVS 的指令

在模組中加入新的檔案

1. 先check out 模組
2. 在模組所在的目錄下建立新檔案
3. 用cvs add filename 告訴CVS 這個檔案也要作版本控制
4. 再用cvs commit filename 把檔案放入倉庫中。

從模組中將檔案移除

1. 首先確定這個檔案已經完成check in 的動作
2. 以rm filename 移除該檔案
3. 用cvs remove filename 告訴CVS 你要刪除這個檔案
4. 用cvs commit filename 時才真正執行由倉庫中移除檔案的動作。

想了解更多關於CVS 的用法，可以參考cvs 的manual page (man cvs)。

```
retrieving revision 1.3
retrieving revision 1.3.2.1
Merging differences between 1.3 and 1.3.2.1 into foo.c
U project/main.c
cvs commit -m "Merged patch"
```

4.6 附錄六 臭蟲回報管理系統（bug tracking）使用說明

[Login]

This is the login page. Just enter your username and password and hit the login button. There is also a **Save Login** checkbox to have the package remember that you are logged in between browser sessions. You will have to have **cookies enabled** to login.
If the account doesn't exist, the account is disabled, or the password is incorrect then you will remain at the login page. An error message will be displayed.
The administrator may allow users to sign up for their own accounts. If so, a link to Signup for your own account will be available.
You will be allowed to select a project to work in after logging in. You can make a project your default selection from the Select Project screen or from your Account Options.
NOTE: In 0.14.x you were allowed to choose from the login screen. In 0.15.x onwards you will choose after login.

[Select Project]

A list of projects that you are allowed to access will be displayed. If no projects are available then you cannot login. Contanct the administrator to have projects made public or to assign you to have access to certain projects.

[Signup]

Here you can signup for a new account. You must supply a **valid email address** and select a **unique** username. Your randomly generated password will be emailed to your email account.

[Main]

This is the first page you see upon logging in. It shows you the latest news updates for the bugtracker. This is a simple news module (based off of work by Scott Roberts) and is to keep users abreast of changes in the bugtracker or project. Some news postings are specific to projects and others are global across the entire bugtracker. This is set at the time of posting in the Edit News section.
The number of news posts is controlled by a package global. When the number of posts is more than the limit, a link to show "older news" is displayed at the bottom. Similarly a "newer news" is displayed when you have clicked on "older news".
There is an Archives option at the bottom of the page to view all listings.

[Archives]

> A title/date/poster listing of ALL past news articles will be listed here. Clicking on the link will bring up the specified article. This listing will also only display items that are either global or specific to the selected project.

*** *Suggested feature*: Indicator for sitewide post :

> It would be useful to be able to tell when a post is sitewide or just specific to the project.

[View Bugs]

Here we can view the bug listings. The page has a set of viewing filters at the top and the bugs are listed below.

Filters

The filters control the behavior of the Bug List. The filters are saved between browsing sessions but do not currently save sort order or direction. In order from left to right is:

- Search
- Reporter
- Handler
- Category
- Severity
- Status
- Show - show only XYZ bugs
- Changed(hrs) - highlight threshold for updated column. 6 means highlight (in bold) all bugs updated within the last 6 hours.
- Hide Closed

If the number of bugs exceeds the "Show" count in the filter a link for the "Next XYZ" bugs will be displayed at the bottom. Appropriate "Prev XYZ" bug links will also be displayed.
The Search field will look for simple keyword matches in the summary, description, steps_to_reproduce, additional_information, bug id, or bug text id fields. It does not currently search through bugnotes.

Bug List

The bugs are listed in a table and the attributes are listed in the following order: priority, id, number of bugnotes, category, severity, status, last updated, and summary. Each (except for number of bugnotes) can be clicked on to sort by that column. Clicking again will reverse the direction of the sort. The default is to sort by id in descending order.
The bug id is a link that leads to a more detailed report about the bug. Depending on what you have set in your Account Preferences you will

be sent to the simple or advanced view. You can also add bugnotes here.
The number in the bugnote count column will be bold if a bugnote has been added in the specified time frame.
The text in the "Severity" column will be bold if the severity is major, crash, or block and the bug not resolved.
The text in the "Updated" column will be bold if the bug has changed in the last "Changed(hrs)" field which is specified in the viewing filters.
Each table row is color coded according to the bug status. Here is an explanation of the default colorings:

color coding

- red: new - bug is new
- purple: feedback - bug requires more feedback before work can proceed
- orange: acknowledged - lets the user know that the bug has been examined but probably not by the proper developer
- yellow: confirmed - bug has been confirmed by an updater or developer
- blue: assigned - bug is currently being worked on by a developer
- blue-green: resolved - bug should be fixed, waiting on confirmation of fix
- gray: closed - bug is closed
- light gray: closed - bug is closed

severity

- block - prevents further work/progress from being made
- crash - crashes the application or OS
- major - major bug
- minor - minor bug
- tweak - needs tweaking
- text - error in the text
- trivial - being nitpicky
- feature - requesting new feature

status

- new - new bugs
- feedback - bug requires more information, the original posters should pay attention
- acknowledged - bug has been looked at but not confirmed or assigned
- confirmed - confirmed and reproducible (tycpically set by an Updater or other Developer)
- assigned - assigned to a Developer
- resolved - bug should be fixed, waiting on confirmation of fix
- closed - bug is closed

projection

- redesign - needs a redesign
- major rework - large amount of work
- minor fix - shouldn't take a lot of time
- tweak - done in a jiffy

[View Bug Simple]

Here is the simple listing of the bug report. Most of the fields are self-explanatory. "Assigned To" will contain the developer assigned to handle the bug. Priority is fully functional but currently does nothing of importance. Duplicate ID is used when a bug is a duplicate of another. It links to the duplicate bug which allows users to read up on the original bug report.

Users with an access level of Updater, Developer and Administrator can also Update Bug or Delete Bug. It is recommended against deleting bugs unless the bug is frivolous. Instead bugs should be set to resolved and an appropriate resolution category chosen.

Below the bug information there may be a form for uploading file attachments. The Administrator needs to configure the bugtracker to handle file uploads. Each Project needs to set its own upload path.

At the bottom of the bug report are any attached Bugnotes. Only users with Viewer access are precluded from adding Bugnotes.

If the bug is resolved then there will be a Reopen Bug button instead of an Add Bugnote button.

[View Bug Advanced]

The Advanced View is much the same as the Simple View with a few additional fields. Here you can see Projection, ETA, Votes (all which currently have no real effect), Platform, OS, OSBuild, Product Version, Product Build, and Steps to Reproduce. There is also an Add Vote button.

[Add Vote]

@@@ This feature is currently disabled @@@

This increases the vote tally. There is currently no IP spam protection for vote adding. The idea behind the vote counter is to have duplicate reports instead increase the vote count. As the number of reports increase the relative importance of the bug becomes clear. This is somewhat useful in prioritizing the order in which to give attention to bugs. NOTE: currently voting is disabled while I figure out how to better utilize this feature.

[Editing Bugs]

These options are only available to Updaters, Developers, and Administrators.

[Update Bug Simple]

Here you can update various bug fields. The Category, Severity, and Reproducibility fields are editable but shouldn't be unless there is a gross miscategorization.

Also modifiable are the Assigned To, Priority, Projection, ETA, Resolution, and Duplicate ID fields.

[Update Bug Advanced]

Projection and ETA are the only fields that are only modifiable by the Update Bug Advanced page.

[Assign To Me]

If you are a developer you can use this as a one click assign to 'me'. This is for convenience and for saving time.

[Resolve Bug]

This option on the View Bugs page allows you to resolve the bug. It will lead you to a page where you can set the resolution state and a duplicate id (if applicable). After choosing that the user can choose to enter a bugnote detailing the reason for the closure. The bug is then set to

the Resolved state. The reporter should check off on the bug by using the Close Bug button.

[Delete Bug]

This option on the View Bugs page allows you to delete an existing bug. This should only be used on frivolous or test bugs. A confirmation screen will prompt you if you really want to delete the bug. Updaters, Developers, Managers, and Administrators can remove bugs.

[Bugnotes]

Everyone except Viewers can add bugnotes. Only the submitter and Administrators and Managers can delete bugnotes. If the bug is Closed or Resolved then you cannot Add Bugnotes. You will have to Reopen Bug before you can add another bugnote.

[Add Bugnote]

Type in whatever additional information that you remember, ask questions regarding the bug, make suggestions as to the bug fix. Line breaks are preserved (converted to <br>) and limited html may be allowed. These HTML settings are set by the administrator in the config settings.

[Delete Bugnote]

Just click on the Delete Link to remove an unwanted bugnote. There is no confirmation screen.

[Close Bug]

If the bug is currently Resolved you can use this to finally Close the bug. At this state there is confirmation that the issue has been satisfactorily resolved.

[Reopen Bug]

If the bug is currently Resolved or Closed you can use this to Reopen the bug. Then you will be allowed to enter further bugnotes. The bug will automatically be put into Feedback status.

[Report Bug]

Here you can report new bugs. Depending on your Account Preferences and the site and project settings, you will be sent to the simple or advanced report forms. Newly reported bugs are, naturally, put into the new bug status.

[Report Bug Simple]

The simple form lets you report the category, reproducibility, severity, summary, description, and additional information category. All but Additional Information are **required** fields.

Summary should be a short, one sentence description of the problem. It has a limit of 128 characters. Help out the

developers and don't insert useless or misleading lines like "it doesn't work" or "it crashed" or "this sucks".

[Category]

Select the most appropriate category for the report. These categories are defined per project by the project administrator. The administrator should provide an "other" as a catch-all category.

[Reproducibility]

Reproducibilty is the key to being able to quickly fix a bug.

- always
- sometimes
- random
- have not tried
- unable to duplicate

[Severity]

Severity often dictates what bugs need to be fixed in order for a product to be shipped. Normally a product should not ship with any major or higher bugs unless they occur very infrequently.

- block - prevents further work/progress from being made
- crash - crashes the application or OS
- major - major bug
- minor - minor bug
- tweak - needs tweaking (graphic alignment, formatting, etc.)
- text - error in the text, grammar, wording, etc.
- trivial - being nitpicky
- feature - requesting new feature

[Summary]

A brief one line description of the problem. Help out the developer by actually making it descriptive and meaningful.

[Description]

A detailed description of the problem. As a rule of thumb you should always enter enough information for the developer to feel like he is in your shoes. Describe what you were doing, what you expected to happen, what should have happened, the error, setup and system settings, software version(s), and possible ideas and suspicions.

[Additional Information]

Any extra information that you didn't put into the Description should go here. This might be a dump of your error, a proposed fix, or anything that is related to but not directly a part of the bug.

[Report Stay]

Report Stay displays a button that read "Report More Bugs" after you submit the bug. The button allows you to return to the report bug screen after submitting a bug and it will automatically fill in most of the pertinent settings from the previous bug (category, severity, and more). This is useful when inputting multiple bugs at once.

[Report Bug Advanced]

The advanced form has, of course, more fields to fill in than the simple version. It has, in addition to the simple form fields, an option to choose between choosing an existing Account Profile or filling in the computer platform, operating system, and operating system version/build, product version, product build, and steps to reproduce. You may optionally directly assign a bug to a developer.

[Steps to Reproduce]

List the detailed steps to reproduce a problem. This is useful for bugs that take a while to show up or tricky cases. A developer will take an order of magnitude more time to fix a bug that is not easily reproducible. So, if at all possible go back and try to reproduce the bug. It would be best to use a format that looks like.

1. step 1
2. step 2
3. step 3

[Summary]

This shows a detailed summary of the state of the bugtracker according to several (hopefully) useful metrics. This section is in its infancy and will eventually include a useful set of metrics, graphs, and reports.

[Account]

This page allows the user to change his username, email, and password. It also has subsections to Manage Profiles and Change Preferences. If an admin has "protected" the account then the user is not allowed to change his username, email or password. This is to allow single access public accounts (like a guest account).

[Change Preferences]

This page allows the user to specify several user preference choices.

- Default Project - This is the project you are automatically logged into when you log into the bugtracker
- Advanced Report
- Advanced View
- Advanced Update
- Refresh Delay - You can set the view bugs pages to refresh every X minutes. 0 means never refresh (you have to do it manually) and the administrator can set a minimum refresh setting. THe minimum setting exists to prevent too many users from hammering on the server
- Redirect Delay - Each action page has a delay value that you can set. Minimum of 0
- Email on New - Email you if you are a Developer, Manager, or Administrator when a new bug report is filed.
- Email on Assigned - Email you when a bug you are attached to is set to assigned
- Email on Feedback - Email you when a bug you are attached to is set to Feedback status
- Email on Resolved - Email you when a bug you are attached to is set to Resolved status
- Email on Closed - Email you when a bug you are attached to is set to Closed status
- Email on Reopened - Email you when a bug you are attached to is Reopened
- Email on Bugnote Added - Email you when a bug you are attached to has a Bugnote added
- Email on Status Change - Email you when the status of a bug you are attached to is changed (NOT IMPLEMENTED)
- Email on Priority Change - Email you when the priority of a bug you are attached to is changed (NOT IMPLEMENTED)
- Language - Select your preferred language

You can reset the defaults with the "Reset Prefs" button. The administrator sets the default values in the

configuration file.

Future user level default preferences will be displayed here.

[Manage Profiles]

Here you can add new profiles. This is useful when you don't want to keep re-entering your system configuration in the Advanced Bug Reports. It allows for multiple bug reports for multiple system configurations. There is a "Description" field as a catchall for more details

You can also edit, set different profiles to be defaults and delete profiles. To set your account to have no default just select the blank profile and choose "Make Default".

*** *Suggested feature*: User specified fields :

> It would be really useful for projects to be able to tailor what their reporting needs would be. This would also be reflected in the Advanced Bug Reports section.

[Users]

This section is reserved for Managers and Administrators.
Here a manager or administrator can specifically assign a user to a project. They can be assigned at an arbitrary access level so a developer could be 'demoted' to a updater for this specific project. Conversely a reporter could be 'promoted' to be a developer.
To limit access to a project to all users you should make the project private and then raise the access threshold to administrators. You can do this via the Manage | Manage Projects subsection. You will then have to manually assign users to be added to the project.

[Manage]

This section is reserved exclusively for Administrators.

[Manage Users]

The main Manage page shows a list of users and their relevant info. Username, email, access level, enabled status, protected status, date created, and last visit. From here the admin can choose to edit the user's info. If people can signup for accounts and the admin chooses to reset the users information the user's password will be randomly generated and emailed to the user. If users cannot signup for accounts the password will be set to be blank. There is currently no way for a user to be notified of his password should he forget it.

This section displays all accounts created in the last week as well as those that have never logged in. The Prune Accounts link will delete all accounts older than 1 week that have never logged in.

[Manage Projects]

Projects are handled from this section. You will see a listing of each project as well as an Add Project form at the top of the page. You can edit the categories and versions of a project by clicking on the Edit link. If a

project is marked private it will be hidden from non-Developers/Managers/Administrators. Disabled projects are hidden from all but Administrators. The status of a project can also be selected (development, release, stable, obsolete). The description currently is only displayed in this section.

The Upload File Path is where project documents and bug file attachments will be stored (if the option is enabled in the config settings). This directory must be writable by the webserver. As a result this is most useful in private Intranet settings. Public web hosts are unlikely to grant such permissions to users. An option to store into databases is forthcoming.

In the edit project section you can update the project information, delete the project, or add versions and categories. You can also update and delete the versions and categories.

Remember to add at least one category for your project!!! Otherwise, you won't be able to enter bug reports.

[Create Account]

Create a new account in this section. Default is to have the account enabled and set to reporter. Currently this does **not** send an email to the user.

Access Levels

- viewer - Can only browse and view bug listings (eg. guest accounts)
- reporter - Can report new bugs and add bugnotes
- updater - Same as reporter and can update bugs (eg. trusted testers, power users)

- developer - More privileges than updater. People working on the project
- manager - More privileges over Developers. Can assign others to any projects that are being managed. Can also make news postings.
- administrator - All powerful account. Can create accounts, reset passwords, remove users, and more.

The access levels will continue to grow in capabilities as more features are added to the package.

[Documentation]

This is just a page with hard coded links to ChangeLog, README, INSTALL, UPGRADING, and CONFIGURATION. It also displays the phpinfo() to let the administrator see his server settings.

[Edit News]

Managers and Administrators are allowed to make news posts from this section. These posts show up in the Main section.

[Add News]

Enter a headline and then the message. Line breaks will be preserved (converted to <br> tags). Do **not** use the " character in the headline. It will be converted to a ' if you do. The " character confuses the Edit Post drop down list as well as the text input field when editing.

Also select the project that the post will be posted to. By default the currently active project will be selected. You can select a sitewide post if you wish the news item to appear on every single news page. Posts in this category would affect all projects of the bug tracker. This is useful for spreading information such as system downtime, upgrades, global changes, and so on. Only Administrators can select sitewide posts.

[Edit/Delete News]

At the bottom you can either edit the selected post or delete it. The default action is to edit the post. You will be taken to a screen where you can edit the post. If you choose delete then you will be taken to a page requiring delete confirmation. The drop down list is populated only by the posts that the logged in user posted unless you are an Administrator in which case all posts will be displayed. Only administrators are allowed to modify posts made by other users.

NOTE: Currently, only the original post date and original poster are displayed.

[Docs]

This is where to find documentation for using the bugtracker and project specific documentation.

[Project Documentation]

This section displays project specific documentation. Developers, Managers, and Administrators can upload documentation for each project. This might be specific notes on known issues, product usage, API documentation, etc.

The documents are given a title and a description and are uploaded into the directory specified in the Project Settings.

[User Documentation]

This link displays this document.

[Logout]

This deletes the user cookie and redirects the user to a specified page (default is to redirect to the index page which redirects the user to the Login page)

4.7 附錄七 問題與解決狀況列表

遭遇的問題：以下為這段日子，所遇到的問題，及其解決的狀況。報告的格式為：問題簡述（那個檔案、什麼變數所遭遇的問題）、解決方法、解決狀況。

[檔案引用之問題]

問題簡述： CC 與 TC 共用的 include file 裡有 include TC 的 include 檔，導致 link 時會 link TC 部分的 code，造成錯誤。
檔案位置：include/STRUCT.h
解決方式：將 TC include 部分移走，獨立出來，確保不會跟 TC 有衝突。

問題簡述： Global Data 裡的*.h 與 *.c 會有 Multiply define 的問題。
檔案位置：Global_Other/*.h *.c
解決方式：將 include 檔與程式檔定位清楚，避免兩者均作變數宣告。

[模擬器使用問題]

問題簡述： Simulator 編譯完成的執行檔不能 Load。
檔案位置：main.cmd
解決方式：缺少一個 main.cmd 的設定檔，將它加入專案中重新編譯即可。

問題簡述：Simulator 的 float type 變數用 Watch window 看會顯示錯誤。
檔案位置：none。
解決方式：這是 Simulator 的問題，無法解決（只是數值的顯示結果有誤，實際上的二進位值並沒有錯誤，因此仍然可以進行模擬，但在看結果時，必須小心這種狀況）。

問題簡述：CC 與 TC 共用的 include file 裡有 include TC 的 include 檔，導致 link 時會 link TC 部分的 code，造成錯誤。
檔案位置：include/STRUCT.h
解決方式：將 TC include 部分移走，獨立出來，確保不會跟 TC 有衝突。
問題簡述： Global Data 裡的*.h 與 *.c 會有 Multiply define 的問題。
檔案位置：Global_Other/*.h *.c
解決方式：將 include 檔與程式檔定位清楚，避免兩者均作變數宣告。

[翻譯本模組成 C 語言版本所遇到的問題]

檔名:ccinit.src	位置:line 327
程式碼: ; Start the RTDP, ; RTDPDPR = RTGOCMD, ; RTDPMSGO = 0. LIM R0,RTGOCMD ST R0,RTDPDPR STZ RTDPMSGO	
問題: 在 ccio.src 中定義 RTDPDPR 為 array，而這裡	
解決方法: 這裡應該是把 RTDPDPR array 的每一個 element 當作一個 flag 來用 而 RTDPDPR 在組語裡即代表 RTDPDPR[0] 因此可以使用 RTDPDPR[0] 作為 CC 和 RTDP 間的 SYN word	

檔名:bitinz.src	位置:line 553
程式碼: ; Clear the RDB RT input interrupt words, ; ANTM = ANTMSGI, ; RTDPM = RTDPMSGI. L R0,ANTMSGI L R0,RTDPMSGI	
問題: 同時把兩個變數放到 R0	
解決方法: ?	

檔名:bitccc.src	位置:line 371
程式碼: INCM 1,BITTRY07+3*2+1	

問題: 不確定 BITTRY07 的 array index 是 1 or 2
解決方法: BITTRY07 是 type 為 TEST_STATUS 的 array TEST_STATUS 定義在 DTRAM.src 中，是三個 word 的 structure index 為 2, 3*2 表示 BITTRY07[0]和 BITTRY07[1]的空間，所以再加 1 則表示 BITTRY07[2]的第二個 word

檔名:bitccc.src	位置:line 403
程式碼: LM R7,TEST02	
問題: LM 的第一個參數應該是數字，然而 R7 沒有 assign 數字	
解決方法: 在組語裡面，R7 實際上會被解碼為數字存放在 instruction 中。所以這樣子的用法相當於寫成 LM 7,TEST02	

檔名:bitccc.src	位置:line 396
程式碼: ; Leave the Test Status 1 Word set to the CPU self test status stored ; during the CPU self test, ; DTRSLT(DTCCID).DTSTAT1 already contains CPU self test results	
問題: 不知道這一段註解要不要翻成 code	
解決方法: 依照註解的寫法，應該是說 DTRSLT(DTCCID).DTSTAT1 的值已經等於 CPU self test results 了，所以應該不用翻。	

檔名:bitccc.src	位置:line 472 等
程式碼: ; CALL BITDPRSM (MEMSTAT, 3, BITTRY07(3).TRY, DTRTDPID)	
問題: MEMSTAT 沒有定義	

解決方法:
MEMSTAT 是 local data stucture 或許可以自行定義在 bitccc 裡面
不過 bitdprsm.src 也會用到這個型別，卻也完全沒有定義

檔名:ccinit.src 等	位置:line 380

程式碼:

```
; Initialize the task dispatcher interrupt mask,
; CURSTAT = X'61B4'.
   LIM      R0,061B4
   ST       R0,CURSTAT
```

問題:
CURSTAT 在 ccinit.src 裡的註解是 integer ，然而在 tc/mtram.src 中的定義是

```
; *       CURSTAT : INTERRUPT_RECORD; range n/a; units n/a;
; *                 Interrupt service area used for all interrupts
; *                 which return via the 1750A executive.
CURSTAT EQU     $               ;CURRENT STATUS STORAGE
INTBST  EQU     $               ;INTERRUPT 11 STATUS STORAGE
INTDST  STOR    3               ;INTERRUPT 13 STATUS STORAGE
INTDSER STOR    3               ;INTRUPT LEVEL 13 DEVICE
```

解決方法:

1750/mcram.src 中宣告 CURSTAT 和 INTDST

```
; *       CURSTAT   : constant integer;
; *                   range n/a; units n/a;
; *                   Current status storage.
  CURSTAT EQU       $                 ;CURRENT STATUS STORAGE
  INTBST  EQU       $                 ;INTERRUPT 11 STATUS STORAGE
  INTDST  STOR      3                 ;INTERRUPT 13 STATUS STORAGE
  INTDSER STOR      3                 ;INTRUPT LEVEL 13 DEVICE
```

tc/mtram.src 宣告 CURSTAT

```
; *       CURSTAT : INTERRUPT_RECORD; range n/a; units n/a;
; *                 Interrupt service area used for all interrupts
; *                 which return via the 1750A executive.
; *
  CURSTAT EQU       $                 ;CURRENT STATUS STORAGE
  INTBST  EQU       $                 ;INTERRUPT 11 STATUS STORAGE
  INTDST  STOR      3                 ;INTERRUPT 13 STATUS STORAGE
  INTDSER STOR      3                 ;INTRUPT LEVEL 13 DEVICE
```

dp/tccdprom.src 中定義了 INTERRUPT_RECORD 為

```
; *       type INTERRUPT_RECORD is record;
; *               MASK      : integer at word 0;
; *                           Interrupt mask.
; *               STATWORD : integer at word 1;
; *                           Interrupt status word.
; *               INT_ADD   : pointer at word 2;
; *                           Pointer to module to process this interrupt.
; *       end record;
```

比對 MCRAM.src 和 MTRAM.src 的定義，CURSTAT 應該是屬於 INTERRUPT_RECORD 的型別，所以在這裡的用法為

CURSTAT->MASk=0x61b4

（資料結構引用的問題）

檔名:ccinit.src	位置:line 327

程式碼:

```
; Start the RTDP,
; RTDPDPR = RTGOCMD,
; RTDPMSGO = 0.
    LIM     R0,RTGOCMD
    ST      R0,RTDPDPR
    STZ     RTDPMSGO
```

問題:

在 ccio.src 中定義 RTDPDPR 為 array，而在註解中卻把它當成 interger 來用

解決方法:

這裡應該是把 RTDPDPR array 的每一個 element 當作一個 flag 來用
而 RTDPDPR 在組語裡即代表 RTDPDPR[0]
因此可以使用 RTDPDPR[0] 作為 CC 和 RTDP 間的 SYN word

（資料結構引用的問題）

檔名:ccinit.src 等	位置:line 380

程式碼:

```
; Initialize the task dispatcher interrupt mask,
; CURSTAT = X'61B4'.
  LIM     R0,061B4
  ST      R0,CURSTAT
```

問題:

CURSTAT 在 ccinit.src 裡的註解是 integer ，然而在 tc/mtram.src 中的定義是

```
; *     CURSTAT : INTERRUPT_RECORD; range n/a; units n/a;
; *               Interrupt service area used for all interrupts
; *               which return via the 1750A executive.
CURSTAT EQU     $               ;CURRENT STATUS STORAGE
INTBST  EQU     $               ;INTERRUPT 11 STATUS STORAGE
INTDST  STOR    3               ;INTERRUPT 13 STATUS STORAGE
INTDSER STOR    3               ;INTRUPT LEVEL 13 DEVICE
```

解決方法:

1750/mcram.src 中宣告 CURSTAT 和 INTDST

```
  ; *     CURSTAT  : constant integer;
  ; *                range n/a; units n/a;
  ; *                Current status storage.
  CURSTAT EQU     $               ;CURRENT STATUS STORAGE
  INTBST  EQU     $               ;INTERRUPT 11 STATUS STORAGE
  INTDST  STOR    3               ;INTERRUPT 13 STATUS STORAGE
  INTDSER STOR    3               ;INTRUPT LEVEL 13 DEVICE
```

tc/mtram.src 宣告 CURSTAT

```
  ; *     CURSTAT : INTERRUPT_RECORD; range n/a; units n/a;
  ; *               Interrupt service area used for all interrupts
  ; *               which return via the 1750A executive.
  ; *
  CURSTAT EQU     $               ;CURRENT STATUS STORAGE
  INTBST  EQU     $               ;INTERRUPT 11 STATUS STORAGE
  INTDST  STOR    3               ;INTERRUPT 13 STATUS STORAGE
  INTDSER STOR    3               ;INTRUPT LEVEL 13 DEVICE
```

dp/tccdprom.src 中定義了 INTERRUPT_RECORD 為

```
; *     type INTERRUPT_RECORD is record;
; *             MASK     : integer at word 0;
; *                        Interrupt mask.
; *             STATWORD : integer at word 1;
; *                        Interrupt status word.
; *             INT_ADD  : pointer at word 2;
; *                        Pointer to module to process this interrupt.
; *     end record;
```

比對 MCRAM.src 和 MTRAM.src 的定義，CURSTAT 應該是屬於 INTERRUPT_RECORD 的型別，所以在這裡的用法為

CURSTAT->MASk=0x61b4

（原始程式有疑義）

檔名:bitinz.src	位置:line 553
程式碼: ; Clear the RDB RT input interrupt words, ; ANTM = ANTMSGI, ; RTDPM = RTDPMSGI. L R0,ANTMSGI L R0,RTDPMSGI	
問題: 同時把兩個變數放到 R0	
解決方法: ?	

（原始程式有疑義）

檔名:bitccc.src	位置:line 371
程式碼: INCM 1,BITTRY07+3*2+1	
問題: 不確定 BITTRY07 的 array index 是 1 or 2	
解決方法: BITTRY07 是 type 為 TEST_STATUS 的 array TEST_STATUS 定義在 DTRAM.src 中，是三個 word 的 structure index 為 2, 3*2 表示 BITTRY07[0]和 BITTRY07[1]的空間，所以再加 1 則表示 BITTRY07[2]的第二個 word	

（原始程式有疑義）

檔名:bitccc.src	位置:line 403
程式碼: LM R7,TEST02	
問題: LM 的第一個參數應該是數字，然而 R7 沒有 assign 數字	
解決方法: 在組語裡面，R7 實際上會被解碼為數字存放在 instruction 中。所以這樣子的用法相當於寫成 LM 7,TEST02	

（原始程式有疑義）

檔名:bitccc.src	位置:line 396
程式碼: ; Leave the Test Status 1 Word set to the CPU self test status stored ; during the CPU self test, ; DTRSLT(DTCCID).DTSTAT1 already contains CPU self test results	
問題: 不知道這一段註解要不要翻成 code	
解決方法: 依照註解的寫法，應該是說 DTRSLT(DTCCID).DTSTAT1 的值已經等於 CPU self test results 了，所以應該不用翻。	

（變數未定義）

檔名:bitccc.src	位置:line 472 等
程式碼: ; CALL BITDPRSM (MEMSTAT, 3, BITTRY07(3).TRY, DTRTDPID)	
問題: MEMSTAT 沒有定義	
解決方法: MEMSTAT 是 local data stucture 或許可以自行定義在 bitccc 裡面 不過 bitdprsm.src 也會用到這個型別，卻也完全沒有定義	