

Detailed Design

Code Critiquer System for the C Language and Embedded C

sdmay25-23:

James Joseph

Samuel Lickteig

Alix Noble

Andrew Sand

Owen Sauser

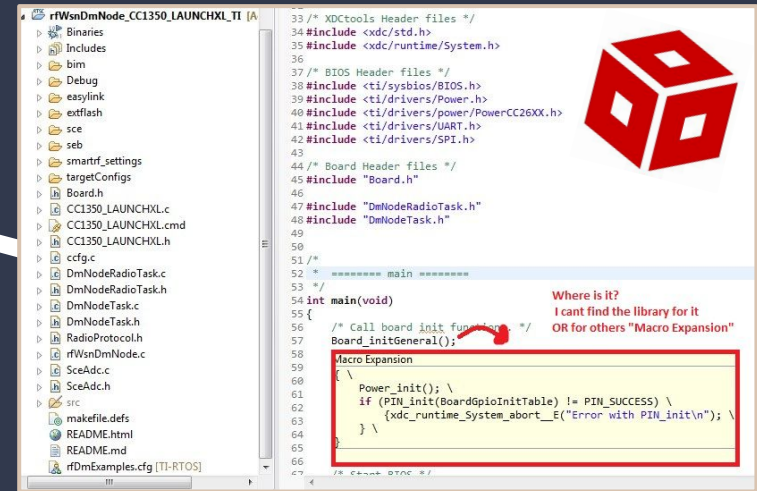
Code Critiquer System for the C Language and Embedded C

Project Overview

- Current state of project (continuation of sdmay24-34) is a web-based critiquer tool
 - Students upload C files to tool
 - Files are statically analyzed to search for antipatterns
 - Tool generates feedback
 - Students use feedback to improve skills
- Will modify current system and/or develop new prototypes
- Ideally tailored for CPR E 288
- Targeting a Spring Semester Prototype

- Static Code Analysis is a challenging problem
- Many off-the-shelf solutions
 - Many leave a lot to be desired
 - They are not bespoke for CPR E 288 usage
 - No off-the-shelf “perfect combination” for what the project client needs
- Client needs a code critiquer that can...
 - Be accessed by students and instructors
 - Provide beginner-oriented feedback
 - Ability to give embedded and datasheet-focused feedback
 - Potentially integrate with Code Composer Studio

Problem Statement

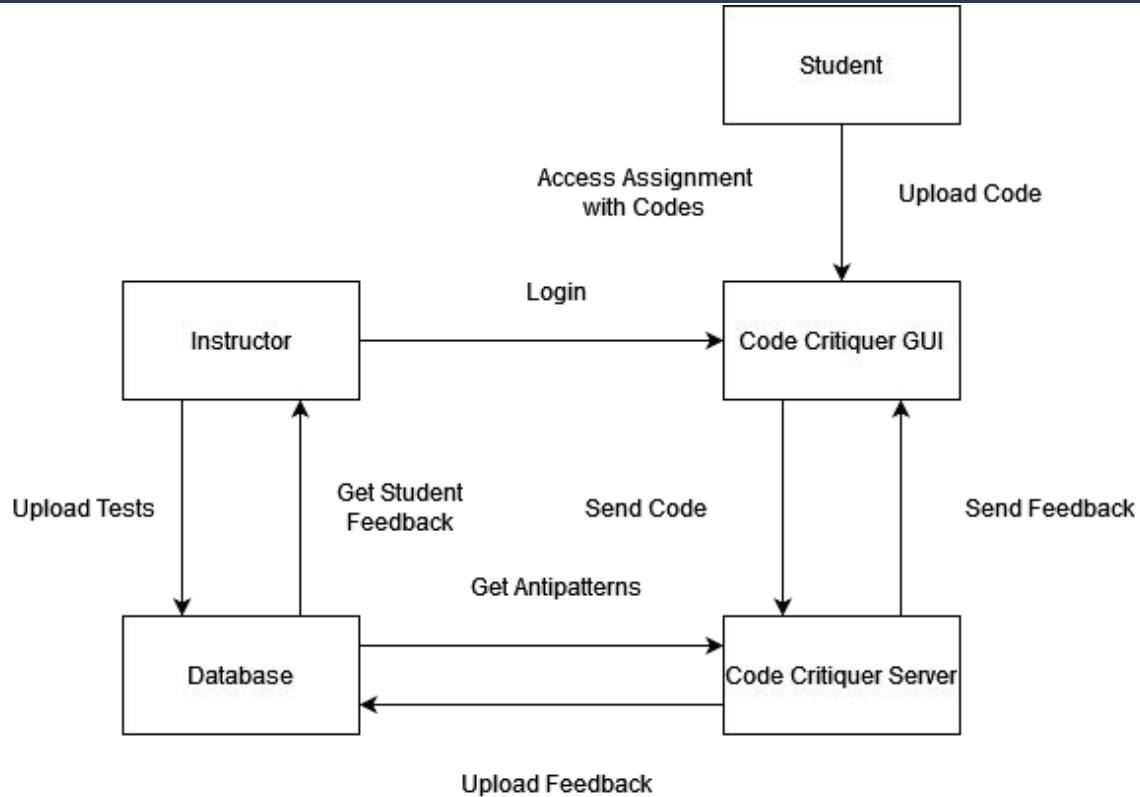


The screenshot shows the Code Composer Studio interface. On the left is a file explorer for the project 'rfWsnDmNode_CC1350_LAUNCHXL_TI'. The main window displays a C source file with the following code:

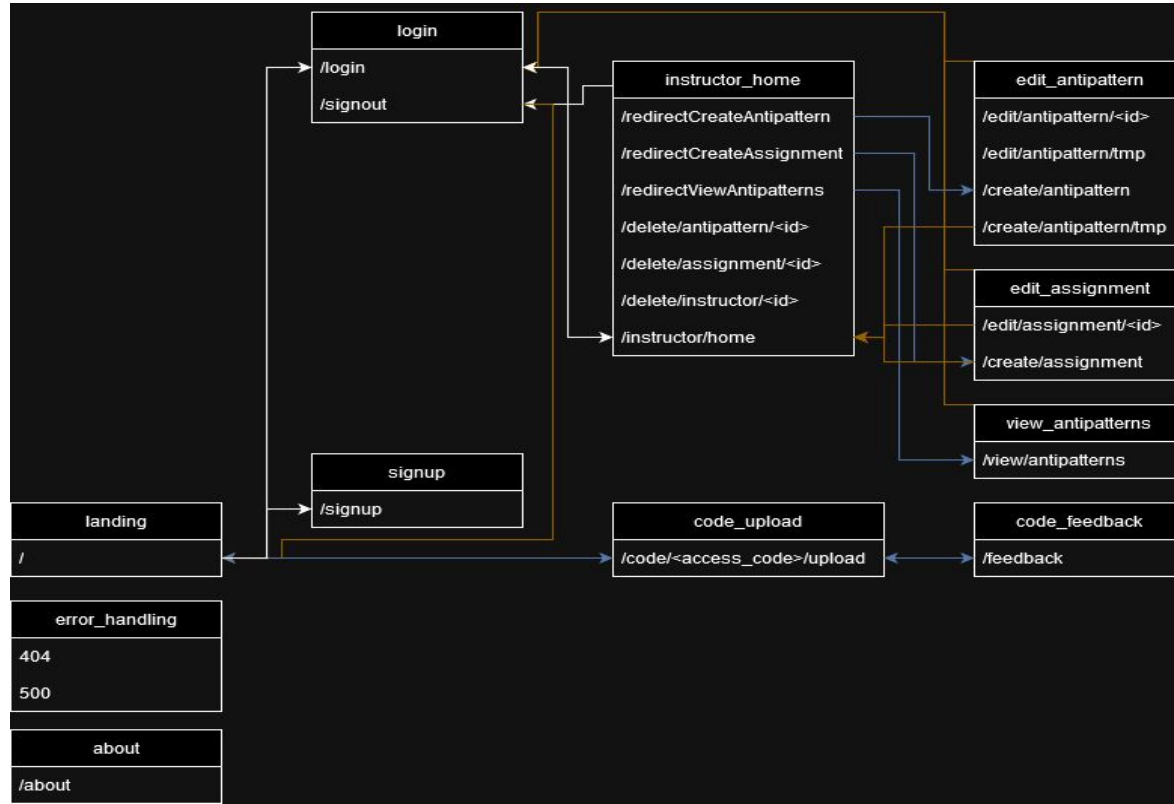
```
33 /* XDCtools Header files */
34 #include <xdc/std.h>
35 #include <xdc/runtime/System.h>
36
37 /* BIOS Header files */
38 #include <ti/sysbios/BIOS.h>
39 #include <ti/drivers/Power.h>
40 #include <ti/drivers/power/PowerCC26XX.h>
41 #include <ti/drivers/UART.h>
42 #include <ti/drivers/SPI.h>
43
44 /* Board Header files */
45 #include "Board.h"
46
47 #include "DmNodeRadioTask.h"
48 #include "DmNodeTask.h"
49
50
51 /*
52 * ===== main =====
53 */
54 int main(void)
55 {
56     /* Call board init function */
57     Board_initGeneral();
58
59     Macro Expansion
60     {
61         Power_init(); \
62         if (PIN_init(BoardGpioInitTable) != PIN_SUCCESS) \
63             {xdc_runtime_System_abort_E("Error with PIN_init\n"); \
64         } \
65     }
66
67 /* Start BIOS */
```

A red box highlights the 'Macro Expansion' section, and a red arrow points to the 'Board_initGeneral()' call. A red text box with a white background contains the message: "Where is it? I can't find the library for it OR for others 'Macro Expansion'". A red 3D cube icon is positioned to the right of the code editor.

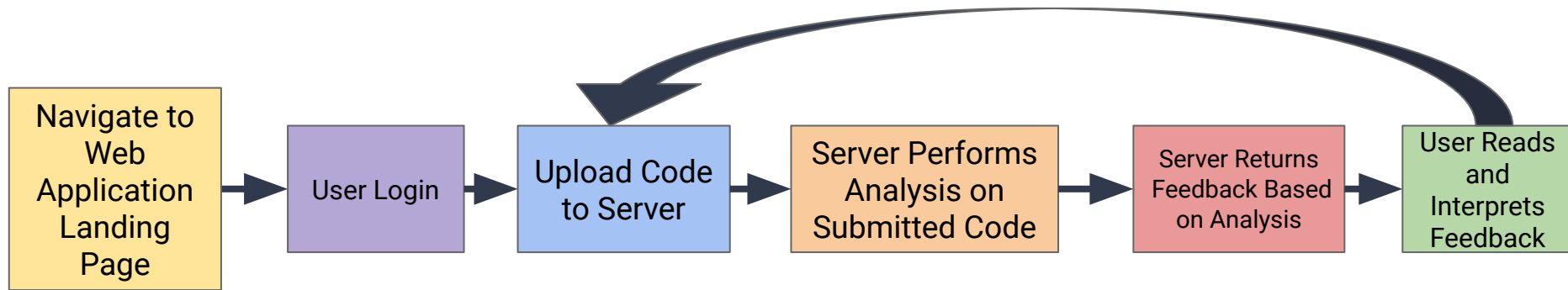
System Sketch



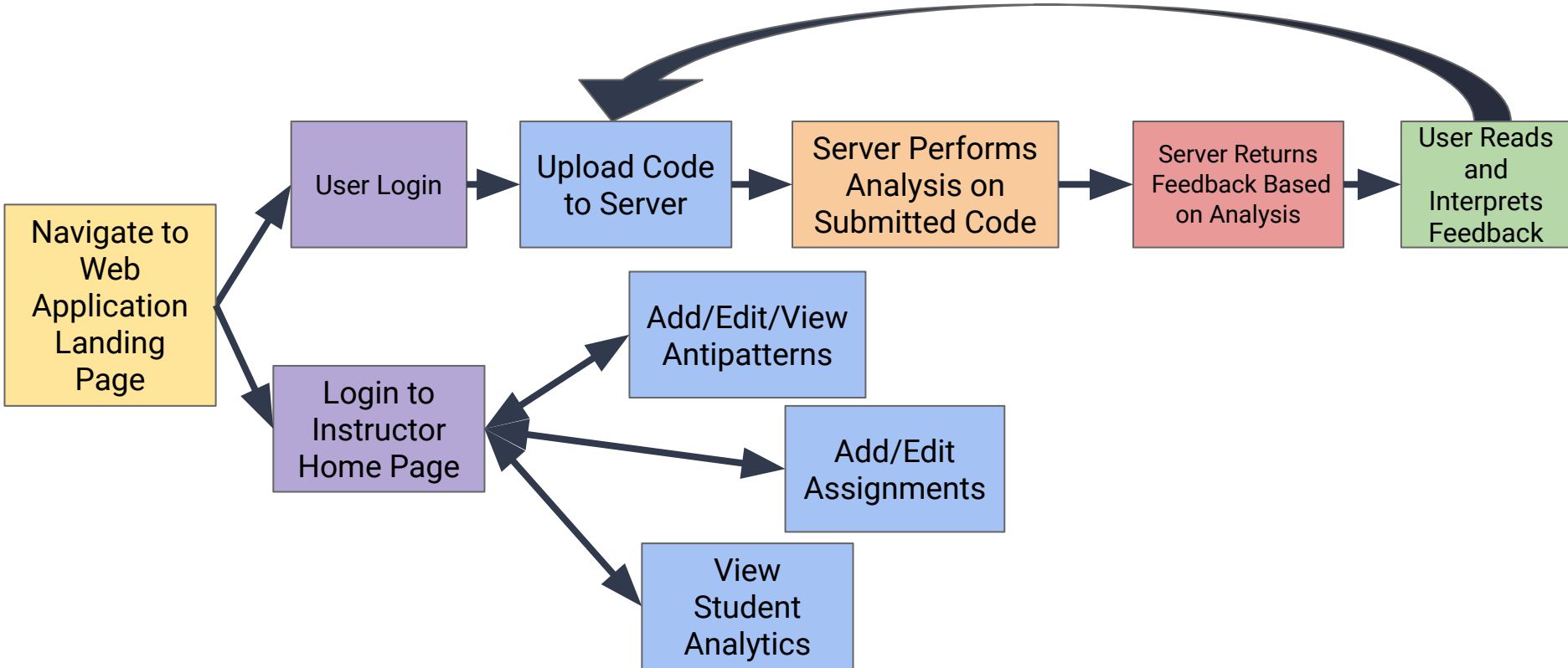
Page Flow Diagram



Functionality (Student)



Functionality (Instructor or Teaching Assistant)



Technology Considerations

- In practice this program needs to be put onto a server instead of hosted locally
- Whatever server it is put on must be able to handle potentially tens of CprE 2880 students using it and uploading code simultaneously
- Need to consider safe crash recovery options

Areas of Concern and Development

- Current design will fit user needs well
 - Provides students an efficient way of getting feedback on their code
 - Provides instructors and teaching assistants a way of tailoring feedback and analysis per CPR E 2880 lab
- Concerned about “tying it all together”
 - System has several complex parts that all need to work in unison to achieve desired results

Conclusions from Detailed Designs

IOWA STATE
UNIVERSITY
Software Engineering

- The project has a number of moving parts
- Critical to ensure that data flow is lossless between functions and pages of the system
- Users need to be able to navigate between each page without confusion
- Need to have a robust server for running the system

Any Questions, Suggestions, or
Comments?