

Homework Help Tool (H2T)
–a hypermedia system to manage C programming assignments

Independent Study Report
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Introduction

In C programming courses, the professors assign program implementation assignments to students. The students submit their solutions for each of these assignments. Each of these solutions needs to be graded. In the recent past CourseWeb, a general purpose course content management system was used for managing course content. The things that can be done using CourseWeb are very limited in the domain of C programming, as it is a general purpose system. We needed a C programming specific course management system, where we can annotate the assignments and solutions with C programming concepts ontology. We need a system which we can experiment with and add specific features that can be customized as required in C programming domain. As a general system designed to manage course content for every course that is offered in the University cannot be altered according to the research specific needs, we decided to write a new system that will accomplish all our goals.

Homework Help Tool or H2T is a C programming courses specific content management system, that will provide the instructors with the ability to add concepts using an ontology, parse student solutions to see which of the required concepts for the particular assignment were touched in the solution, which were not and the likes. The system will provide the users with a lot of information outside the scope of current course management systems. The version we present in this paper is the first version of the aforementioned system. This system is the first step towards having a completely customized adaptive hypermedia system specific to the needs of a C programming course. H2T allows instructors to enter assignments online and grade solutions submitted by students. The students can read assignments and add their solutions to the system. Each student can add only one solution for each assignment. Instructors can add any number of assignments and choose which assignments should be set to visible for the students. This means instructors may add all the assignments at the beginning of the term and allow them to be seen by students only when required.

H2T Instructor Interface

The instructor's interface is very simple to use. The first page that the instructor sees after logging in is the home page. The instructor can view all the assignments that have been added by her with a brief report about the options selected for them on this page. There is a link to log off on the top right corner of the screen. This has been marked in the screen shot displayed below. The interface is continuous, it means, each page appears to be similar to the every other page, only the content of the page and page description alone changes. The navigation links are available for users on the top of the page as shown in the screen shot below. The four options that instructors have with the interface are to view all assignments and their options selected, add an assignment, edit an assignment, and grade an assignment. Below the navigation links is the page description. The page description is displayed in red foreground below the navigation links. It briefly says what this page is about. These features are common to all pages in the interface.

Below we describe the home page which is meant to view all assignments. The content of this page consists of a table with columns describing the assignment number, name, is it

The screenshot shows the H2T interface with a yellow header and navigation tabs. The main content area contains a table of assignments. The table has columns for Assn No, Assn Name, Visible, and Last Date. The assignments listed are:

Assn No	Assn Name	Visible	Last Date
1	HW1	Yes	2006-01-01
1	HW1 Repeated	Yes	2006-01-01
2	A Gardening task	Yes	2007-01-01
6	HW6	Yes	2006-12-20

At the bottom of the page, it says: Author: Vikrant Khenat. email: vak13(at)pitt.edu

Figure 1: Home, view all assignments

available for students to view and the submission date marked as Last Date by the instructor. The assignment names are hyperlinks, which when clicked display details about that particular assignment. The view assignment page is displayed below.

The screenshot shows the H2T interface with a yellow header and navigation tabs. The main content area displays details for assignment 1:

Assignment number: 1
 Assignment name: HW1
 Assignment question:
 1. Try visible features, ask questions, answer questions.
 2. Home page (picture!) - up to 4pts.
 3. Complete a Pre-test - results are not counted towards your grade - 1pt.
 4. Search the Web, find a programming course that uses Karel or a similar language, post URL and a message to the test forum - 1pt.

Notes:

A due date for the items 1, 2 and 3 will be determined later, and will be announced then. Item 4 is due on Tuesday, 1/10/2006. Instead of posting to the forum, it should be sent to the instructor's email address (valeriab_1@yahoo.com).

Last Date: 2006-01-01 00:00:00 Visible: Yes

At the bottom of the page, it says: Author: Vikrant Khenat. email: vak13(at)pitt.edu

Figure 2: View Assignment

The screenshot shows the H2T interface with a yellow header and navigation tabs. The main content area displays a table of submissions for assignment 1:

Select the student you wish to grade for this assignment

Assn No	Assn Name	Student	Submission Date	Current Grade
1	HW1	stl	2006-12-02	5

At the bottom of the page, it says: Author: Vikrant Khenat. email: vak13(at)pitt.edu

Figure 3: Select solution to grade

The view assignment page displays the assignment number, name, the question, submission date and is it available for students to view. If the instructor chooses to click on grade assignment on this page, a list of submissions of assignments by students for this assignment is displayed. The page where students list is displayed to choose from is described below.

For this assignment only one student solution exists as can be seen from the figure. The submission date and current grade is also displayed. If the solution has not been graded yet, the current grade is “not graded”. If the instructor decides to grade a particular solution, a new page displaying the assignment and student’s solution is opened up as can be seen below.

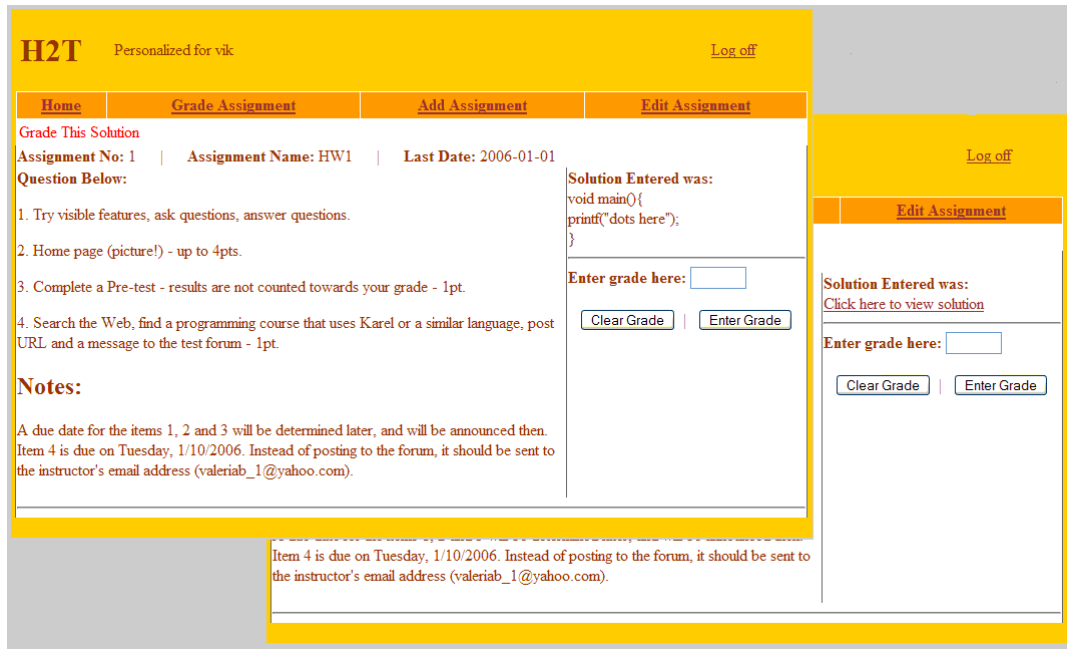


Figure 4: Grade Solution

The instructor can enter the grade in the area provided. If the student chooses to upload a file in place of the assignment and the solution is replaced by a link. When user clicks on the link, the solution is displayed in a separate window. The two varieties of the choices are displayed in figure 4. The page on top displays the solution entered in text format and the page under the top page display the link to the file entered by the student.

The instructors can add an assignment with a question entered in text format or a file which can be uploaded on the server. The pages to add an assignment and upload a file are displayed below.

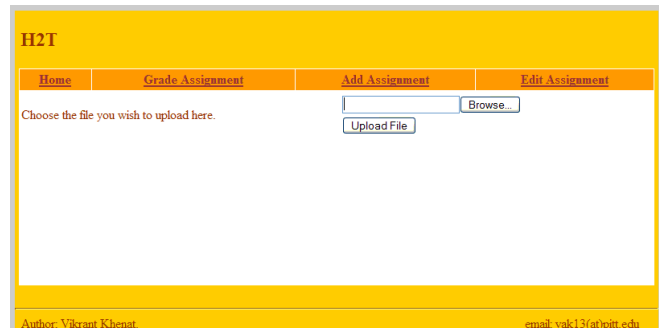
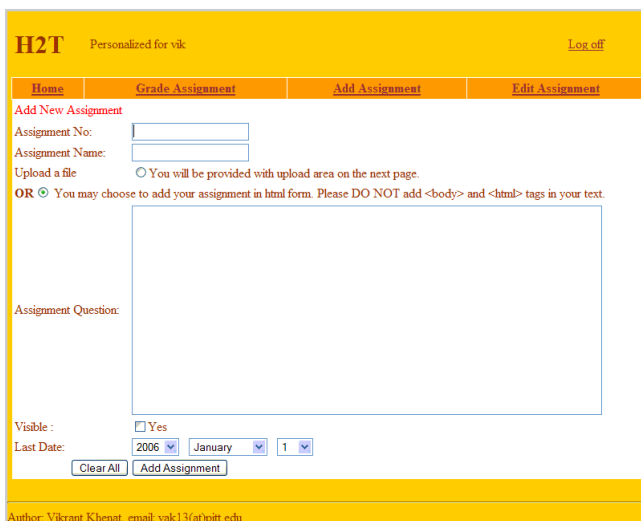


Figure 5: Add assignment (left), Upload a file (top)

The page to edit an assignment is displayed below in Figure 6. The interface is quite similar to add assignment's except that the input boxes are already populated with data entered by the instructor at the time of adding them. The user can very easily change the data and update the existing assignments.

These pages together gives the user the ability to add, edit, view, and grade an assignment. These are all the functions that can be applied to an online assignment. The students can now log into the system and view the assignments and upload their solutions, either in text or file format. In the next section we discuss the student's interface.

H2T Personalized for vik [Log off](#)

[Home](#) [Grade Assignment](#) [Add Assignment](#) [Edit Assignment](#)

Edit This Assignment

Assignment No:

Assignment Name:

You may choose to add your assignment in html form. Please DO NOT add <body> and <html> tags in your text.

Assignment Question:

```
<P>1. Try visible features, ask questions, answer questions.
<br><P>2. Home page (picture!) - up to 4pts.
<br><P>3. Complete a Pre-test - results are not counted towards your
grade - 1pt.
<br><P>4. Search the Web, find a programming course that uses Karel or a
similar
<br>language, post URL and a message to the test forum - 1pt.
<br><H2>Notes:</H2>
<br><P>A due date for the items 1, 2 and 3 will be determined later, and
will be
<br>announced then. Item 4 is due on Tuesday, 1/10/2006. Instead of
posting to the
<br>forum, it should be sent to the instructor's email address
<br>(valeriab_1@yahoo.com) . </P>
```

Visible : Yes

Use Current Last Date: 2006-01-01

Select Last Date: 2006 January 1

Figure 6: Edit assignment

H2T Student Interface

The student's pages can be discussed as consisting of four sections. The header, which displays the student's name and allows them to log off anytime, the navigation links which consist of only three options, namely home, add solution and edit solution, the page descriptor and finally the page content. The home page for students is shown below.

Assignment No.	Assignment Name	Last date	Grade
1	HW1	2006-01-01	5
1	HW1 Repeated	2006-01-01	Not graded
2	A Gardening task	2007-01-01	Not graded
4	A Walk In The Woods	2007-02-04	Not Graded

Figure 7: Student Home Page

The student can view an assignment by clicking on the hyperlink provided on the home page. When clicked, a next page displays the assignment with the option to add or edit the solution. If the student clicks on add solution page to add solution to that assignment is opened up. Below are two pages, one to view an assignment and the other to add a solution. In the first screen the question entered was in text format. You can see the

Figure 8: View Question, and Add Solution pages

question there. In the next screen shot, the question entered was in file format, you can see a link to open the question on a new page. The students have an option to enter solution in text or file format. A radio button is provided to the students to select the format of their input solutions. To edit a solution the student can choose an assignment and click on edit assignment.

H2T Personalized for st1 [Log off](#)

[Home](#) [Add Solution](#) [Edit Solution](#)

Edit This Solution [Note: Current Date Will Be Saved As Submission Date]

Assignment No: 4 | Assignment Name: A Walk In The Woods | Last Date: 2007-02-04

Question: [Click here to view question](#)

Enter Solution Here: (Please do not use <html> and <body> tags, you may choose to add any other html tags as required)

```
#include <stdio.h>
#include <conio.h>
void main(){
int i, j;
printf("\nnew solution");
for(i=0; i< 10 i++){
for(j =0; j< 10; j++){
printf("%d * %d =
%d", i, j, (i*j));
```

Figure 9: Edit Solution

Future Plans

H2T was designed to assist C programming courses and it has room for future improvements and customization. We want to add the following new features.

- Ability to add concepts dynamically.
- Parsing concepts automatically from solutions.
- Version control with uploaded files.
- Presenting meta information about questions and solutions.
- Present information that will help instructors to grade solutions easier.

References

Blackboard Inc. Blackboard Course Management System 5.1, Blackboard Inc.
<http://www.blackboard.com/>