



UNIVERSITY OF HUDDERSFIELD

MENG GROUP PROJECT

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# Cryptic Crossword Solver

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WEEKLY MINUTES

*Authors:*

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Stuart LEADER

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*Supervisor:*

Dr. Gary ALLEN

*Examiner:*

Dr. Sotirios BATSAKIS

Friday, 9<sup>th</sup> May 2014

# Chapter 1

## Weekly Minutes

During the life cycle of the project the team engaged in weekly meetings, to which each meeting was recorded. Within this group appendix a copy of each week's minutes will be available. Table 1.1 outlines minutes that are included within this document.

Meeting No.	Date	Notes
1	Tuesday, 1st October 2013	
2	Tuesday, 8th October 2013	
3	Tuesday, 15th October 2013	
4	Tuesday, 22nd October 2013	
5	Tuesday, 29th October 2013	
6	Tuesday, 5th November 2013	
7	Tuesday, 12th November 2013	Guidance week [No Meeting]
8	Tuesday, 19th November 2013	
9	Tuesday, 26th November 2013	
10	Tuesday, 3rd December 2013	
11	Tuesday, 10th December 2013	
12	Tuesday, 17th December 2013	
13	Tuesday, 21st January 2014	
14	Tuesday, 28th January 2014	
15	Tuesday, 4th February 2014	
16	Tuesday, 11th February 2014	
17	Tuesday, 18th February 2014	
18	Tuesday, 25th February 2014	Guidance Week [Non-scheduled Meeting]
19	Tuesday, 4th March 2014	
20	Tuesday, 11th March 2014	

Table 1.1: Weekly minutes overview

# **CMP3410 Group Project**

## **Meeting Minutes**

1 October 2013

### **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Mohammad Rahman, Gary Allen

### **Open Issues**

None.

### **New Business**

A feasibility study is to be conducted by all members into the two ideas that have been highlighted as potential projects:

- Bookmarks 2.0
- Fridge App

### **Agenda for Next Meeting**

1. Review the four Feasibility studies
2. Decide upon a project ready for teaching week 3 (WC 14/10/2013).

### **Next Meeting**

The next meeting will be at 10:15am on October 8, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (1<sup>st</sup> October 2013)

# **CMP3410 Group Project**

## **Meeting Minutes**

8<sup>th</sup> October 2013

### **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Mohammad Rahman, Gary Allen

### **Open Issues**

Last week's feasibility study was conducted, and the group did not manage to come any closer to obtaining a project – see New Business #2,

### **New Business**

1. Asked Gary to see if we can have a room change to a more suitable room, such as a meeting room.
2. After a group discussion and input from Gary, it was decided that the group would choose to develop a cryptic crossword solver / generator.
3. The Project Proposal will need to be completed by Friday, 18<sup>th</sup> October 2013
4. It was announced that the internal project moderator was Colvin Venters. The project examiner has yet to be confirmed.

### **Agenda for Next Meeting**

1. Project Proposal (Draft)

### **Next Meeting**

The next meeting will be at 10:15am on October 15, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (8<sup>th</sup> October 2013)

# **CMP3410 Group Project**

Meeting Minutes

15<sup>th</sup> October 2013

## **Present**

Leanne Butcher, Luke Hackett, Stuart Leader.

## **Open Issues**

Project Proposal

## **New Business**

1. Completed the project proposal.

## **Agenda for Next Meeting**

1. Research
2. Check deadline for the project handin

## **Next Meeting**

The next meeting will be at 10:15am on October 22, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (15<sup>th</sup> October 2013)

# **CMP3410 Group Project**

Meeting Minutes  
22<sup>nd</sup> October 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen

## **Open Issues**

1. Development Environments – It was discussed that instead of looking at various different mobile operating systems and making a decision to develop in various languages such as Objective C for Apple and Java for Android to look at one language or development environment which will produce a product for multiple platforms. Titanium Studios was introduced by Gary Allen.
2. Research – To carry on with research into the areas given to each team member at last week's meeting which are as follows:
  - i. Mohammad – The mobile market
  - ii. Stuart – Natural Language Processing
  - iii. Luke – Web Services
  - iv. Leanne – Cryptic Crosswords In General
3. Team Structure – It was decided that the team is to have a democratic structure with Mohammad Rahman appointed as Team Leader/Project Manager and Luke Hackett as the Deputy.

## **New Business**

1. Start looking at development models
2. Research into Titanium Studios

## **Agenda for Next Meeting**

1. Each team member to present findings from their research areas
2. Produce Risk Assessment of Team members
3. Discuss next steps

**Next Meeting**

The next meeting will be at 10:15am on October 29, 2013, in CW2/01.

Minutes submitted by: Mohammad Rahman (24<sup>th</sup> October 2013)

# **CMP3410 Group Project**

Meeting Minutes  
29<sup>nd</sup> October 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen

## **Open Issues**

1. Waiting upon Natural Language Processing research before deciding upon the 'backend' architecture choice (web service, database).
2. Ensure research is written up to a presentable standard.
3. Luke to write up development methodologies to a presentable standard.

## **New Business**

1. Obtained feedback from the examiner.
2. Project proposal has some errors:
  - a. 2<sup>nd</sup> paragraph, page 2 spelling mistake.
  - b. MoSCoW ordering needs checking
  - c. Project Plan needs to be more detailed
  - d. Ensure clues contain references
3. Titanium has been chosen as the platform to be developed in.
4. Github to be used for version control

## **Agenda for Next Meeting**

1. Produce Risk Assessment of Team members
2. Peer review of the research and development methodologies sections

## **Next Meeting**

The next meeting will be at 10:15am on November 5, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (29<sup>th</sup> October 2013)



# **CMP3410 Group Project**

Meeting Minutes  
5<sup>th</sup> November 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen

## **Open Issues**

1. Produce Risk Assessment of Team members
2. Peer review of the research and development methodologies sections

## **New Business**

1. No timetabled meeting next week. Moved to Wednesday, 13th November.
- 2.

## **Agenda for Next Meeting**

1. Produce Risk Assessment of Team members
2. Peer review of the research and development methodologies sections

## **Next Meeting**

The next meeting will be at 11:30am on November 12, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (05<sup>th</sup> November 2013)

# **CMP3410 Group Project**

Meeting Minutes  
19<sup>th</sup> November 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen

## **Open Issues**

1. Requirements and Designs
2. Project Decisions

## **New Business**

1. Gary raised an issue that we should have some UML designs produced by now.
2. The requirements analysis seem have been bloated, out although we do have a set of functional requirements that designs could be based off.
3. We need to make decisions with regards to what and where we are taking the project before starting designs.

## **Agenda for Next Meeting**

1. Start designs
2. Peer review of the research and development methodologies sections

## **Next Meeting**

The next meeting will be at 10:15am on November 26, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (19<sup>th</sup> November 2013)

# **CMP3410 Group Project**

Meeting Minutes  
26<sup>th</sup> November 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen

## **Open Issues**

1. Requirements and Designs

## **New Business**

1. Presentation is due to be presented during week 0 of term 2 (consolidation week).
2. Group has decided upon web service with a thin client.
3. The client will be a web browser rather than a mobile application. Although if time is available a mobile application can be added on.
4. In order to get a better feel for some of the tasks, a prototyping coding session will be undertaking this week. This will allow for up to four solving algorithms to be developed to in order to gauge the amount of work that is required to be done.
5. Luke is to setup a basic development web service, and will ensure that a web service can be setup upon the helios.hud.ac.uk.

## **Agenda for Next Meeting**

1. Algorithm development
2. Designs

## **Next Meeting**

The next meeting will be at 10:15am on December 3, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (26<sup>th</sup> November 2013)

# **CMP3410 Group Project**

Meeting Minutes  
03<sup>rd</sup> December 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader.

## **Open Issues**

1. Requirements and Designs
2. Algorithm development

## **New Business**

1. The algorithms that had been developed, worked very well with the little resources that we had.
2. This should now be able to feed into the designs, and allow for designs to be started.
3. Mohammad suggested that the project should be put on hold for a week due to other module commitments. However Luke said that the schedule has already slipped, and cannot slip further. Luke suggested that he would start the designs, so that we would have something to discuss at next week's meeting.

## **Agenda for Next Meeting**

1. Designs

## **Next Meeting**

The next meeting will be at 10:15am on December 10, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (3<sup>rd</sup> December 2013)

# **CMP3410 Group Project**

Meeting Minutes  
10<sup>th</sup> December 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

## **Open Issues**

1. Requirements and Designs
2. Algorithm development

## **New Business**

1. Gary suggested that we should start to ask all parties for their availability during week 0 (term 2) to arrange for a presentation.
2. The designs were started to be looked over, but now there is a question about the requirements.

## **Agenda for Next Meeting**

1. Designs

## **Next Meeting**

The next meeting will be at 10:15am on December 17, 2013, in CW2/01.

Minutes submitted by: Luke Hackett (10<sup>th</sup> December 2013)

# **CMP3410 Group Project**

Meeting Minutes  
17<sup>th</sup> December 2013

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

## **Open Issues**

1. Requirements and Designs
2. Algorithm development
3. Mid-term Presentation

## **New Business**

1. Gary stated that the designs were okay from an initial look. Due to the lack of detail a full analysis could not be made.
2. Gary recommended that we look at various patterns that may help in development. The Gang of Four book would help us in developing a plugin based architecture.
3. Majority of the week's work has been spent upon other modules.
4. A number of solvers have been identified as the easiest to implement, and it was the group's intention to get them working before the presentation.
5. Objectives for the Christmas break are to be set mainly around the requirements and design aspect of the project.
6. Presentation needs to be completed, and given during week 0 of term 2, and the presentation needs to tell the examiner about the project, e.g. aims/objectives, research, plan, evaluation strategy, background, discuss problems as well as positives.

## **Agenda for Next Meeting**

1. Evaluation of the presentation
2. Christmas break objectives (have they been met)

**Next Meeting**

The next meeting will be at 10:15am on January 21, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (17<sup>th</sup> December 2013)

# **CMP3410 Group Project**

## **Meeting Minutes**

21<sup>st</sup> January 2014

### **Present**

Mohammad Rahman, Luke Hackett, Stuart Leader, Gary Allen.

### **Open Issues**

1. Requirements and designs have now been completed.
2. Algorithm development has started
3. Evaluate the group project that was presented upon 15<sup>th</sup> January
4. Look at finishing the current iteration.
5. Testing the current iteration.

### **New Business**

1. Look at creating an evaluation strategy:
  - a. Compare guardian data sources against other data sources
  - b. Gary suggested that we could look a performance testing the webserver using multiple machines to test throughput.
  - c. Within the evaluation we need to look at performance, and how we could improve the performance.
2. Testing strategy perhaps needs a rethink:
  - a. Compare against existing solvers (performance wise) **OR**
  - b. Compare against a proper ISO usability study
3. Perhaps look at getting feedback from 15 squared – however there may be a lot of feedback, perhaps too much to analyse.

### **Agenda for Next Meeting**

1. Testing

### **Next Meeting**

The next meeting will be at 10:15am on January 28, 2014, in CW2/01.



Minutes submitted by: Luke Hackett (22<sup>nd</sup> January 2014)

# **CMP3410 Group Project**

Meeting Minutes  
28<sup>th</sup> January 2014

## **Present**

Mohammad Rahman, Luke Hackett, Stuart Leader, Gary Allen.

## **Open Issues**

1. Algorithm development
2. Plan of action for this term

## **New Business**

1. The anagram solver now runs far quicker than previous versions
2. Iteration 2 will contain the following:
  - a. Plug & Play architecture
  - b. Palindrome solver
  - c. Double Definition solver
  - d. Shifting solver
  - e. Exchange solver
  - f. Spoonerisms solver
  - g. Abbreviation support.

## **Agenda for Next Meeting**

1. Development process

## **Next Meeting**

The next meeting will be at 10:15am on February 4, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (28<sup>th</sup> January 2014)

# **CMP3410 Group Project**

Meeting Minutes  
4<sup>th</sup> February 2014

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

## **Open Issues**

1. Algorithm development
2. Plug & play architecture

## **New Business**

1. One of the key solvers has been improved from solving a clue in around 50 seconds to 5 seconds (average).
2. The Palindrome solved 30/100 clue types. It failed upon the remaining 40 due to Americanism vs British spellings (e.g. z instead of s), as well as a few pluralised spellings.
3. The homophone solver is partially completed.
4. The plug and play architecture has been developed and is working upon one machine. There appears to be file path errors, and is being fixed by Mohammad.
5. The JS User Interface has been redeveloped to enable easier debugging, and more efficient code. Additional features such as supporting stack traces have been added. A full blown website has now been developed, to make it more like a website rather than a web page.

## **Agenda for Next Meeting**

1. Algorithm development progress

## **Next Meeting**

The next meeting will be at 10:15am on February 11, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (February 4, 2014)

# **CMP3410 Group Project**

Meeting Minutes  
11<sup>th</sup> February 2014

## **Present**

Mohammad Rahman, Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

## **Open Issues**

1. Algorithm development
2. Plug & play architecture

## **New Business**

1. The Spoonerisms algorithm has been completed, and tested.
2. The Palindrome now solves 60/100, although still features the same issues as the found in the previous minutes (American vs British Spellings)
3. A few general UI bug fixes that were caused in very rare circumstances.
4. Gary suggested that if no results are returned, than the tool should tell the user what type of clue it is, e.g. anagram.
5. Plug & play architecture has now been fixed, and is working on all machines.
6. It looks as though Natural Language Processing is starting to be a requirement, and the team will need to discuss how the task is tackled.

## **Agenda for Next Meeting**

1. Algorithm development progress
2. Natural Language Processing usage

## **Next Meeting**

The next meeting will be at 10:15am on February 18, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (February 11, 2014)

# **CMP3410 Group Project**

Meeting Minutes  
18<sup>th</sup> February 2014

## **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

## **Open Issues**

1. Algorithm development
2. Plug & play architecture

## **New Business**

1. Next week (W/C 23<sup>rd</sup> February) is guidance week, and there will be no meeting.
2. Solution traces have been implemented for the currently supported algorithms.
3. The double definition solver has been completed.
4. The spoonerisms solver has almost been completed.
5. Pluralised words are an issue
6. An investigation into the usage of NLP has started
7. Now that we have many solvers, they are all returning a large number of results.  
An investigation into cutting the number of results down will need to be conducted.
8. An alternative web hosting platform has been found, with a domain name of <http://www.crypticsolver.com>
9. Look at creating a Poster for the School marketing department.

## **Agenda for Next Meeting**

1. Algorithm development progress
2. Natural Language Processing usage

## **Next Meeting**

The next meeting will be at 10:15am on February 25, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (February 18, 2014)

# **CMP3410 Group Project**

Meeting Minutes  
25<sup>th</sup> February 2014

## **Present**

Leanne Butcher, Luke Hackett, Stuart Leader (READING WEEK)

## **Open Issues**

1. Algorithm development
2. Plug & play architecture

## **New Business**

1. Homophone algorithm is now solving about 1/3 of the test clues, and is about 50% faster than previous versions.
2. Various tweaks to the confidence rankings to prevent incorrect rankings
3. Reversal algorithm has completed for the basic type of reversals. Problems with synonyms, such as Alpha, Beta are all types of Characters.
4. Design section is 50% of the way written up.

## **Agenda for Next Meeting**

1. Algorithm development progress
2. Natural Language Processing usage

## **Next Meeting**

The next meeting will be at 10:15am on March 4, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (February 25, 2014)

# **CMP3410 Group Project**

## **Meeting Minutes**

4<sup>th</sup> March 2014

### **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

### **Open Issues**

1. Algorithm development
2. Plug & play architecture

### **New Business**

1. Framework for NLP has been implemented, ready for the next iteration.
2. A discussion about how to use it in the project will be required before going forward
3. Testing strategy will need to be considered, perhaps an analysis of the search space against other solvers may be of some use?
4. Spoonerism and double definitions have been further improved, with efficiency changes.
5. The hand-in for the project was confirmed to be **Friday, 9<sup>th</sup> May @ 12:00 noon.**

### **Agenda for Next Meeting**

1. Algorithm development progress
2. Natural Language Processing usage
3. Testing results

### **Next Meeting**

The next meeting will be at 10:15am on March 11, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (March 4, 2014)

# **CMP3410 Group Project**

## **Meeting Minutes**

11<sup>th</sup> March 2014

### **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

### **Open Issues**

1. Algorithm development
2. Plug & play architecture

### **New Business**

1. Charades and deletion algorithms have been implemented.
2. Containers have been started, however there are issues with plural words.
3. Reversal algorithm has been improved so that it uses Natural Language Processing – although it seems a little hacky.

### **Agenda for Next Meeting**

1. Algorithm development progress
2. Testing results

### **Next Meeting**

The next meeting will be at 10:15am on March 18, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (March 11, 2014)



# **CMP3410 Group Project**

## **Meeting Minutes**

18<sup>th</sup> March 2014

### **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

### **Open Issues**

1. Algorithm development
2. Plug & play architecture

### **New Business**

1. The cryptic clue example upon the home page doesn't solve using our solver. Perhaps change it to one that does solve.
2. When testing it was recommended that we buy a cryptic crossword book, which may contain easier clues
3. Design section has been written up. Implementation section has been completed, for the servlet and interface details.

### **Agenda for Next Meeting**

1. Algorithm development progress
2. Testing results

### **Next Meeting**

The next meeting will be at 10:15am on March 25, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (March 18, 2014)

# **CMP3410 Group Project**

## **Meeting Minutes**

25<sup>th</sup> March 2014

### **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

### **Open Issues**

1. Algorithm development
2. Plug & play architecture

### **New Business**

1. Container's development has been completed
2. The charades algorithm has been completed, but it is very slow (runs into the minutes).
3. This will mean that the charades algorithm will not be included in the final presentation, but it should be demonstrated at the final presentation.
4. Solution traces have been added to the reversal algorithm.
5. A suggestion of how "wide" and "deep" the solution trace is, to indicate how complex the solution is.

### **Agenda for Next Meeting**

1. Algorithm development progress
2. Testing
3. Discussion for the presentation format

### **Next Meeting**

The next meeting will be at 10:15am on April 1, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (March 25, 2014)

# **CMP3410 Group Project**

## **Meeting Minutes**

1st April 2014

### **Present**

Leanne Butcher, Luke Hackett, Gary Allen.

Stuart Leader absent due to accident/injury.

### **Open Issues**

1. Documentation
2. Final presentation

### **New Business**

1. The walkthrough of the UI has been completed and written up.
2. The documentation has been checked over by Luke (start – development)
3. **Presentation**
  - a. Start at the beginning from September
  - b. sell the good features e.g. architecture, UI different implementations, publish API for developers
  - c. How efficient are the solvers, what have we done, what we could have done with more resources...
  - d. Set out original aims and objectives
  - e. Testing strategy – put the case forward to reduce difficult questions
  - f. Evaluation and feedback upon the project
  - g. reflect upon the project, what you have/haven't achieved and why?

**Agenda for Next Meeting**

1. Documentation

**Next Meeting**

The next meeting will be at 10:15am on April 08, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (April 01,2014)

# **CMP3410 Group Project**

## **Meeting Minutes**

8th April 2014

### **Present**

Leanne Butcher, Luke Hackett, Stuart Leader, Gary Allen.

### **Open Issues**

1. Documentation

### **New Business**

1. Gary will be available the first and final week of Easter.
2. Testing strategy
  - a. What are we testing for
  - b. Why are we testing the data
  - c. General public testing?

### **Agenda for Next Meeting**

1. Documentation or Presentation

### **Next Meeting**

The next meeting will be at 10:15am on May 6, 2014, in CW2/01.

Minutes submitted by: Luke Hackett (April 04, 2014)