Griffith University

School of Information and Communication Technology

7401ICT (NA) – eService Technology

2008 Semester 2 – Final Examination

WORKING TIME: 3 Hrs 00 Mins
PERUSAL TIME: 15 Mins
EXAMINATION TYPE: Closed Book

PERUSAL INSTRUCTIONS:
Students may not write during perusal

EXAMINATION INSTRUCTIONS TO STUDENTS:
1. The examination has five (5) questions. Each question has several parts. The questions are worth 100 marks in total; not every question is worth the same marks.
2. Write answers to all questions in an answer booklet preferably using blue or black ink (and definitely not red ink).
3. Start your answer to each question on a new page.
4. For those questions that require code to be written, partial credit will be given for description of the algorithm in pseudo-code (or a mixture of code and pseudo-code).
5. If a question appears to you to be incompletely specified, make the assumptions that you think you need to solve the problem, and state your assumptions clearly.

STUDENTS ARE PERMITTED TO BRING THE FOLLOWING MATERIALS INTO THE EXAMINATION VENUE:

CALCULATOR: Calculators not permitted
DICTIONARY: English translation dictionary
OTHER MATERIALS ALLOWED: None.

THE FOLLOWING MATERIALS ARE SUPPLIED BY GRIFFITH UNIVERSITY:
14 PAGE ANSWER BOOK: 1
6 PAGE ANSWER BOOK: 1

THIS EXAMINATION PAPER MUST NOT BE REMOVED FROM THE EXAMINATION VENUE.
Question 1 (20 marks)

a. Name the three fundamental standards that define the World Wide Web.

b. Name the two required elements of every valid HTML 4.01 strict document.

c. Name two reasons for using cascading style sheets to define HTML document presentation in Web applications.

d. Name three ways of accessing cascading style sheets in an HTML document.

e. When submitting data from an HTML form, when should you use method GET and when should you use method POST?

f. Name and briefly define the three tiers of the standard Web application architecture.

g. When should input data be validated on the client and when should it be validated on the server?

h. Briefly define a cookie.

i. Name three different methods of maintaining state in Web applications.

j. Name three different forms of security attack in Web applications.

k. Briefly describe one method of data sanitisation that is performed automatically in Django.

l. Briefly define a one-way function and give one example of its use.

m. If images are stored in a Web application, name three forms of metadata that must be stored with each image.

n. What does the term ”Ajax” stand for and why are Ajax applications currently popular?

o. Name two JavaScript features that make Ajax applications possible.

p. Name one framework that simplifies the task of writing Ajax applications.

q. What is the main design pattern used in Django applications? (Don’t just give the abbreviation, use words.)

r. What does the term ”XML” stand for? Give one example of the use of XML.

s. Name and briefly define the three main components of standard ("big") Web services.

t. Name four criteria that could influence the choice of framework to use for Web application development.
Question 2 (20 marks)

a. Every Django project directory should contain at least three important subdirectories. Name them. (2 marks)

b. Every Django app(lication) directory should contain at least three important files. Name them. (2 marks)

c. Every Django model should contain definitions of at least two important methods. Name the two methods and briefly describe why they are important. (4 marks)

d. Name three types of generic views in Django. (2 marks)

e. Suppose class `Entry` defines a blog entry model and model class `EntryForm` defines a form based on class `Entry`.

Define a Django view `handle_form(request)` that (1) displays an instance of an `EntryForm` using template `entry_form.html` if `request` has method `GET`, and (2) receives and validates the form data, including image data, to create and save a new instance of class `Entry` in the database if `request` uses method `POST`. In case (2), the method should redirect to the URL pattern with name `index` after saving the new instance. (You may assume all required methods have been imported.) (8 marks)

Briefly describe one disadvantage of using the same view to both render a form and process the form data. (2 marks)

Question 3 (20 marks)

a. Suppose you are designing a Web application that allows different registered users to contribute timestamped articles to a single Web log (or blog). All readers of the blog may add one or more comments to each article.

Consider the following database design for such an application.

```python
from django.db import models

class Article(models.Model):
    author_name = models.CharField(max_length=80)
    author_email = models.EmailField()
    title = models.CharField(max_length=160)
    text = models.TextField()
    pubdate = models.DateTimeField()
    comment_author = models.CharField(max_length=80)
    comment_text = models.TextField()
```

Clearly describe two main reasons why this is a bad database design. (4 marks)

Give a better database design for this application. (4 marks)
b. Consider the following database design for an IMDB-like movie database application.

```python
from django.db import models

class Person(models.Model):
    name = models.CharField(max_length=80)
    birthday = models.DateField()
    gender = models.CharField(max_length=1)

class Movie(models.Model):
    title = models.CharField(max_length=80, unique=True)
    director = models.ForeignKey(Person)
    year = models.IntegerField()
    cast = models.ManyToManyField(Person, through="Role")

class Role(models.Model):
    movie = models.ForeignKey(Movie)
    actor = models.ForeignKey(Person)
    role = models.CharField(max_length=80)
```

Clearly describe any assumptions made in this database design. (2 marks)

Write Django statements using the database API that express the following queries. For example, the statement

```python
movies = Movie.objects.all()
```

expresses the query “What are all the movies”.

(i) What is the name of the director who directed the movie (titled) “Manhattan”?
(ii) What are the titles of all movies directed by “Woody Allen” after 1980?
(iii) What is the name of the actor who played the role of “Alvy Singer” in the movie (titled) “Annie Hall”?

(6 marks)

c. What is an atomic database transaction? Briefly describe one situation in which something can go wrong if transactions are not executed atomically. Briefly describe how to ensure transactions are executed atomically in Django.

(4 marks)
Question 4 (25 marks)

Describe how you would design a Web application in Django to provide a simple online community server. Such a server (e.g., Yahoo! Groups) manages groups, messages and members. Each group is concerned with a particular topic, has a summary describing its purpose, is created by some member, and contains a simple (chronological) sequence of messages on that topic.

Users may browse the list of groups and search the list of groups by topic. Users may select a group from the list, browse and search the messages in a group, read individual messages, and return to the list of groups.

Users may become members by registering. Members may login. After logging in, members may do everything arbitrary users can do, and may also create new groups, write new messages in a group, and reply to messages in a group.

For this question, you only need to consider the most important fields of each entity, but you should consider all relevant constraints, e.g., each group has a single creator, each message has a single author, each message belongs to a unique group.

Your description should include the following aspects of the implementation:

a. A database design (models.py): Describe all database models required, indicating the purpose of each model and field by carefully chosen names or by comments, and including any constraints that must hold.

b. A set of URL patterns (urls.py): For each URL pattern, describe what (Django) view it is associated with. (Views may be user-defined views, generic views, or other Django library views.)

c. A set of Django views (views.py): For each user-defined view, describe carefully, in English, what it does, including whether it renders a template or redirects to some URL.

d. A transition diagram: Give a transition diagram, naming each node by a URL pattern, indicating whether each node generates HTML output or is just executed for its effect, and including all transitions between nodes in the diagram.

For simplicity, you do not have to define a model to represent members; you can represent members using the library class django.contrib.auth.models.User.
Question 5 (15 marks)

a. Briefly describe the role of JSON in Web application development. (2 marks)

b. Briefly state what a news feed format is and what a news aggregator application is.
   Give two examples of news feed formats and two examples of news aggregator applications.
   (4 marks)

c. Briefly describe the main concepts behind RESTful Web Services.
   Give two examples of existing RESTful Web Services.
   (4 marks)

d. Briefly describe the purpose of the tools Struts 2, Hibernate, Ant and IntelliJ in Web Development using Java EE, relating these tools to Django equivalents where possible.
   (5 marks)