Imperial College London

Undergraduate Admission Portal

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OVERVIEW

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- Introduction
- Methods & Technologies
- Entire Story of the System
- Main Interfaces Design
- Main Functionalities
- Demonstration of Typical Admission Process
- System Vulnerabilities & Future Work

INTRODUCTION

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- Facts about undergraduate admission at the Department of Computing:
  1) High volume of undergraduate applicants. (204 in 2009)
  2) Only one admission tutor and one admission assistant.
  3) The current undergraduate admission system, based on Linux command and txt files, is with limited functionalities.

- The "Undergraduate Admission Portal" aims to :
  1) develop a formal database system, and
  2) expose the user-friendly interfaces for the system users.

- Three user roles that the system accommodates are:
  1) Tutor / Assistant: evaluate and make decision on various applications.
  2) Clerical: contact with applicants to collect their preferences.
  3) Administrator: super privileges to mange all account info.

TECHNOLOGIES

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- JSP
  1) Processes user request by triggering an action
  2) Displays system response in accordance to the triggered action

- AJAX
  1) Sends user request via XMLHttpRequest Object
  2) Processes response to the pre-configured JavaScript callback methods

- Tomcat
  1) Parses JSP files and displays web interfaces for system users

- Database
  1) Stores applicant's information

- JSON
  1) Lightweight JavaScript-based data interchange format (vs. XML)
  2) Struts2 provides JSON Plug-in to automatically generate JSON results

- JDBC
  1) Common standard in accordance with Java technologies
  2) Connection Pooling technique

ENTIRE STORY

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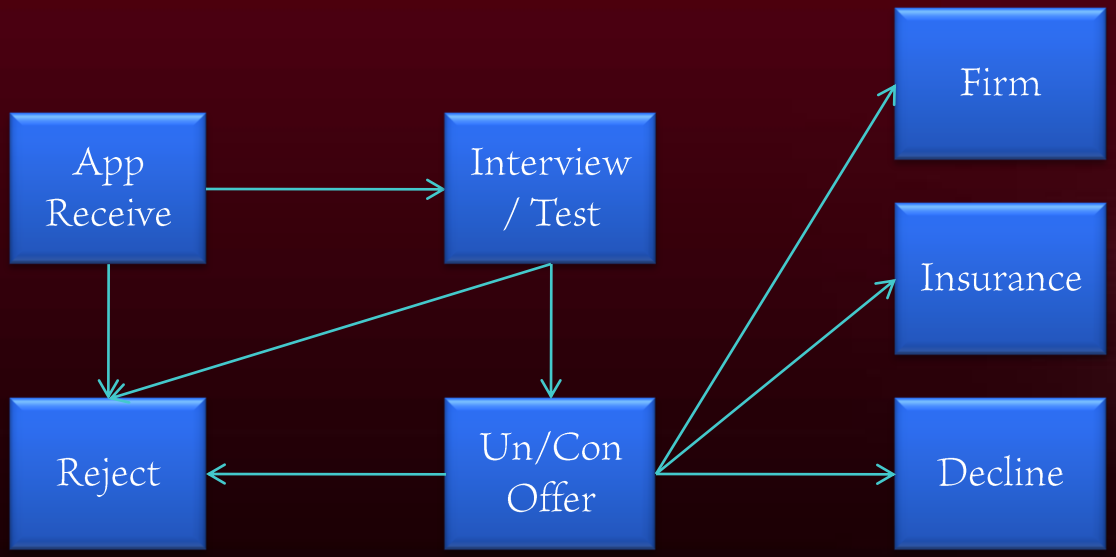

- After received an application, the tutor typically will invite the applicant to an interview or international test.
- After reviewing the interview/test result, the tutor may decide to 1) given an unconditional offer to the applicant; 2) give an conditional offer to the applicant; or 3) reject the applicant.
- If received an offer, the applicant may decide to make it as 1) a firm decision, 2) an insurance decision, or 3) declined.

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ENTIRE STORY (Cont'd)

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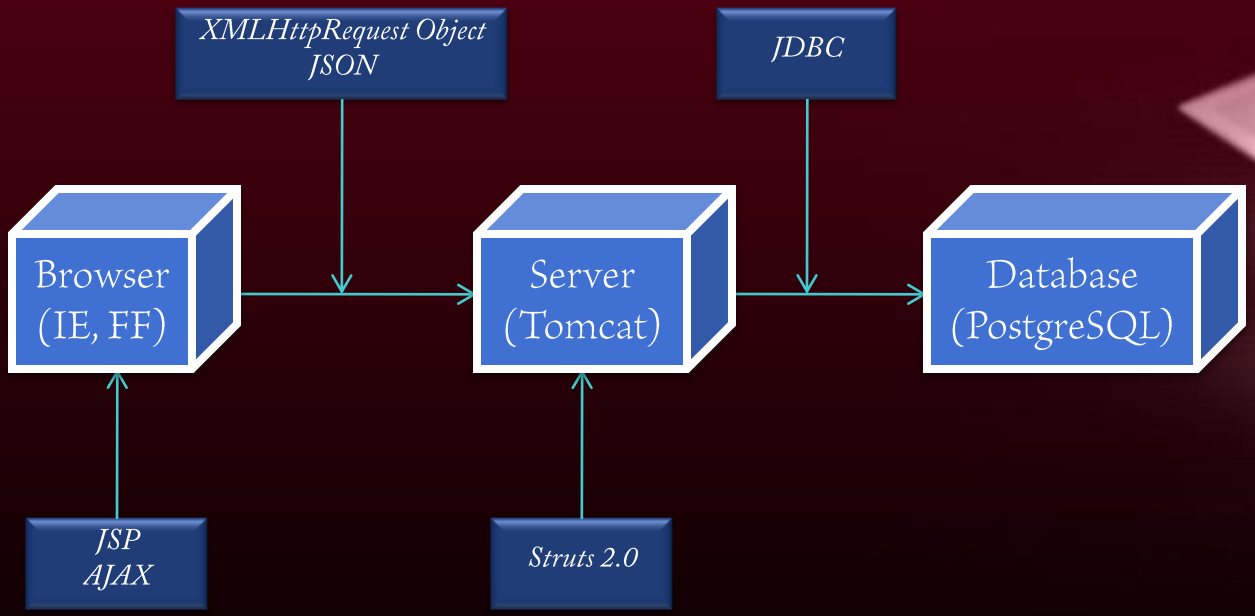

- Three layers in architectural design:
  1) Backstage PostgreSQL Database – *Java DataBase Connectivity (JDBC)*
  2) Frontend JSP-based Web Interface – *AJAX*
  3) Intermediate framework – *Struts 2.0*

ENTIRE STORY (Cont'd)

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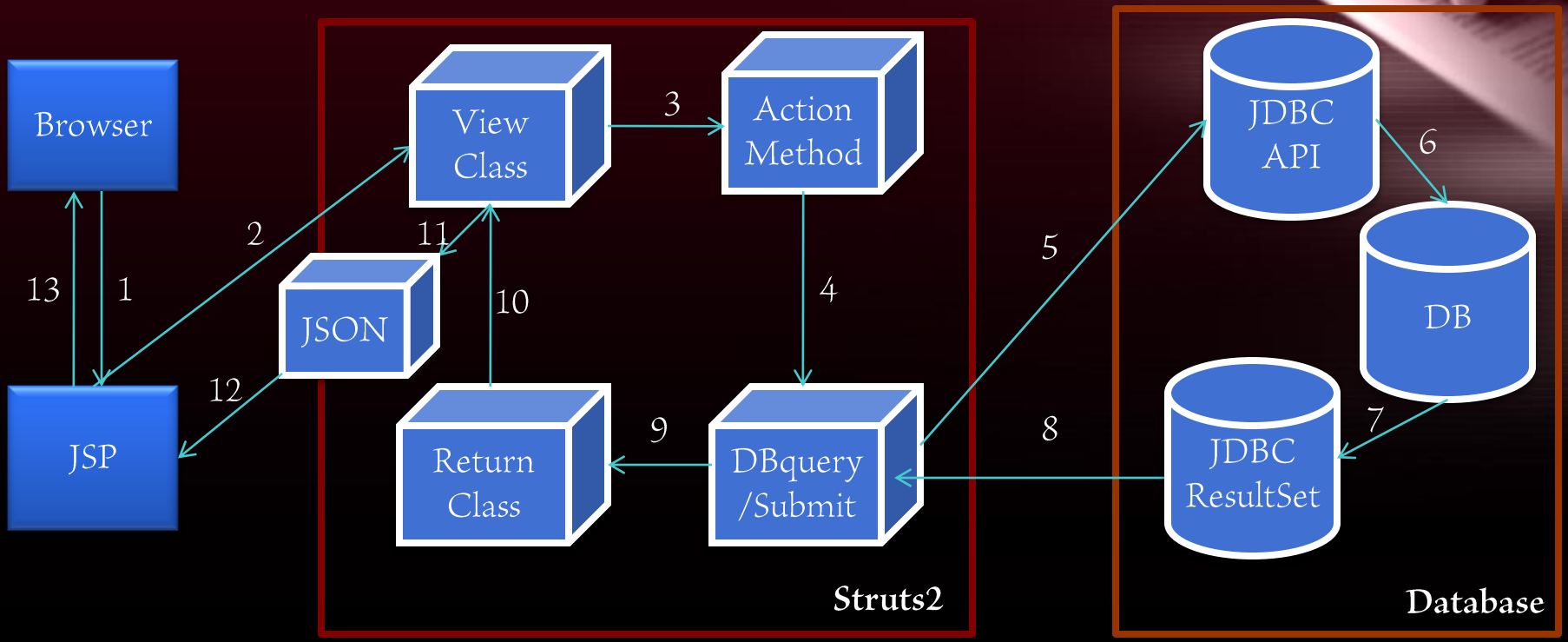
- User Request Procedure
  1) Browser -> JSP -> view class -> Action-> (JSON or not) -> DBquery/Submit -> JDBC API -> DB
- System Response Procedure
  1) DB-> JDBC resultSet -> DBquery/submit -> ReturnClass -> View class -> JSON -> JSP



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INTERFACE DESIGN

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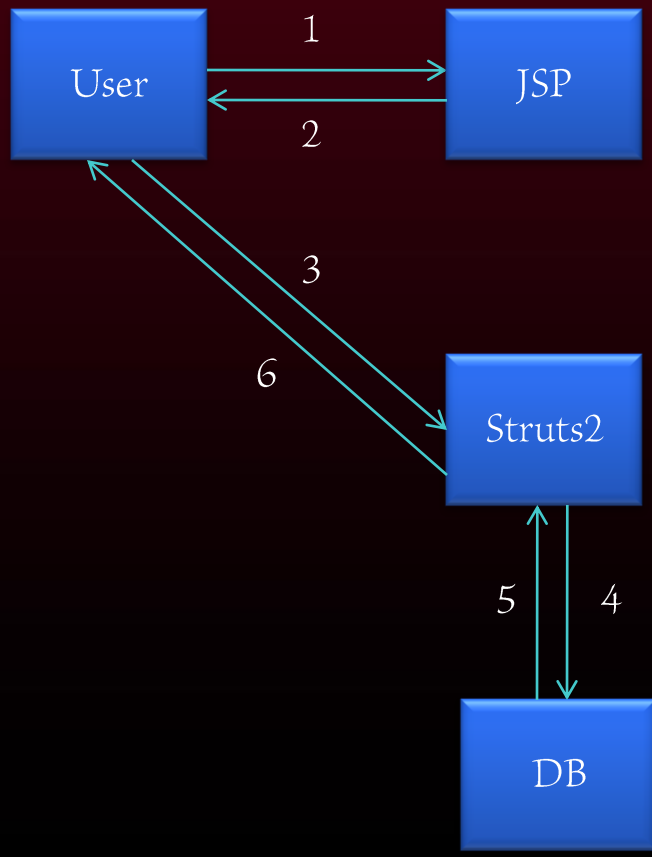
- Security Credential Validation



1. The user requests the web page login.jsp
2. The user is asked to enter the username and password
3. Form submitted, which is then intercepted by struts.xml
4. Legitimacy of the security credential is checked by initiating SQL enquiry via JDBC
5. Gets response from DB
6. Update the web page for user

INTERFACE DESIGN (Cont'd)

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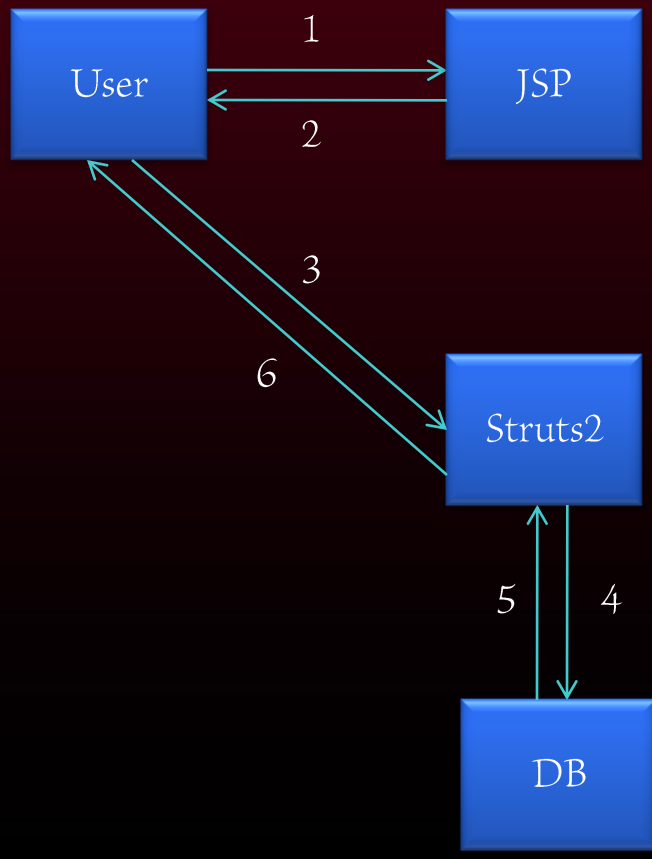
- Dynamic response to user request



1. User makes request to a JSP-based web page
2. Server response
3. User wants to update his/her inputs via AJAX
4. Struts2 maps the action class and update the DB
5. Gets response from DB
6. Dynamically updates web page for user via AJAX

MAIN FUNCTIONALITIES

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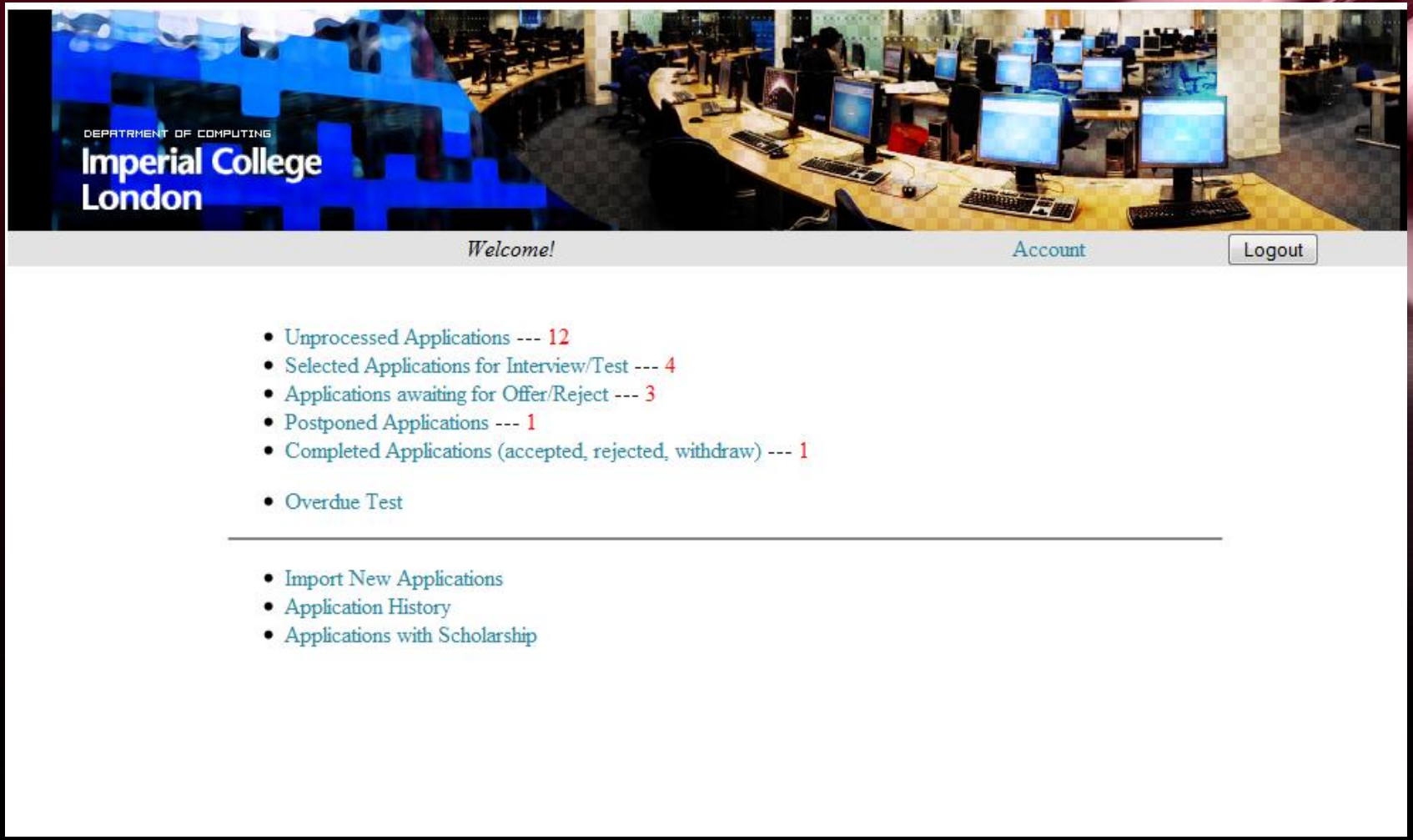
1. Reminder of outstanding figures in various application pools



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MAIN FUNCTIONALITIES (Cont'd)

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2. Multiple process of a group of applicants' interview information (1)

Main >> Selected Applications >> Interview

- Step1: Choose the interview group

UCAS NO	Set Group
ucas507	◉ Group 1 ○ Group 2 ○ Group 3 ○ Group 4 ○ Group 5
ucas506	○ Group 1 ○ Group 2 ◉ Group 3 ○ Group 4 ○ Group 5
ucas503	○ Group 1 ○ Group 2 ○ Group 3 ◉ Group 4 ○ Group 5
ucas504	○ Group 1 ○ Group 2 ○ Group 3 ○ Group 4 ◉ Group 5

Confirm

- Step2: Change Interview Date

There is no selected applications for interview!!

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MAIN FUNCTIONALITIES (Cont'd)

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2. Multiple process of a group of applicants' interview information (2)

Main >> Selected Applications >> Interview

- Step1: Choose the interview group

There is no selected applications for interview!!

- Step2: Change Interview Date

UCAS NO	Group No	Reset Group	Send Letter	Make Further Decision
ucas507	001	Group 1 Group 2 Group 3 Group 4 Group 5 Set	OK	OK
ucas506	003	Group 1 Group 2 Group 3 Group 4 Group 5 Set	OK	OK
ucas503	004	Group 1 Group 2 Group 3 Group 4 Group 5 Set	OK	OK
ucas504	005	Group 1 Group 2 Group 3 Group 4 Group 5 Set	OK	OK

MAIN FUNCTIONALITIES (Cont'd)

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3. Single process of a group of applicants' interview information (1)

Main >> Selected Applications >> Interview

- Step1: Choose the interview group

There is no selected applications for interview!!

- Step2: Change Interview Date

UCAS NO	Group No	Reset Group	Send Letter	Make Further Decision
ucas504	002	○ Group 1 ○ Group 2 ○ Group 3 ◉ Group 4 ○ Group 5 Set	OK	OK
ucas503	003	◉ Group 1 ○ Group 2 ○ Group 3 ○ Group 4 ○ Group 5 Set	OK	OK

MAIN FUNCTIONALITIES (Cont'd)

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3. Single process of a group of applicants' interview information (2)

Main >> Selected Applications >> Interview

- Step1: Choose the interview group

There is no selected applications for interview!!

- Step2: Change Interview Date

UCAS NO	Group No	Reset Group	Send Letter	Make Further Decision
ucas504	004	Group 1 Group 2 Group 3 Group 4 Group 5 Set	OK	OK
ucas503	003	Group 1 Group 2 Group 3 Group 4 Group 5 Set	OK	OK

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MAIN FUNCTIONALITIES (Cont'd)

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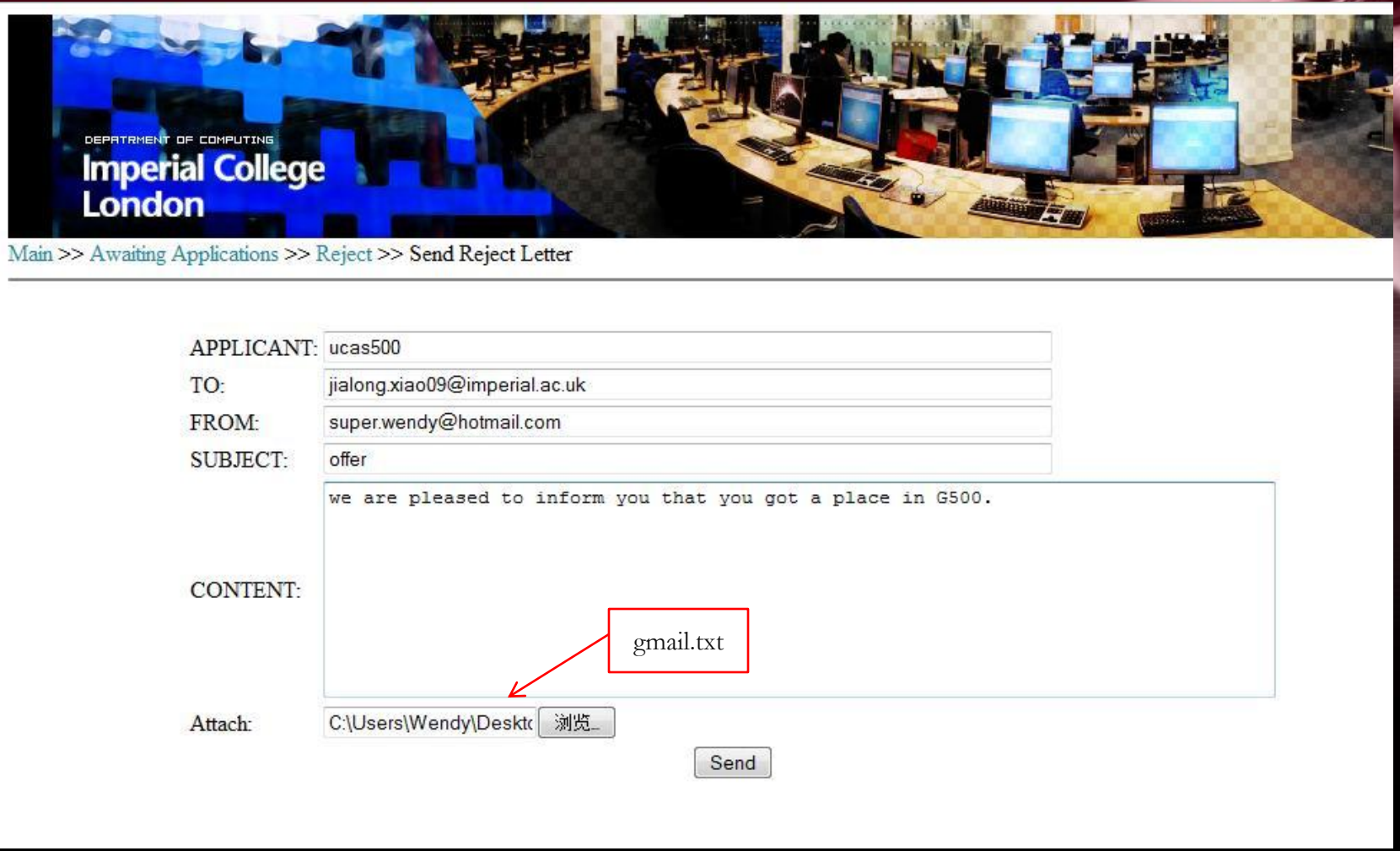
4. Automatic JavaMail-based Email generating and sending mechanism (1)



MAIN FUNCTIONALITIES (Cont'd)

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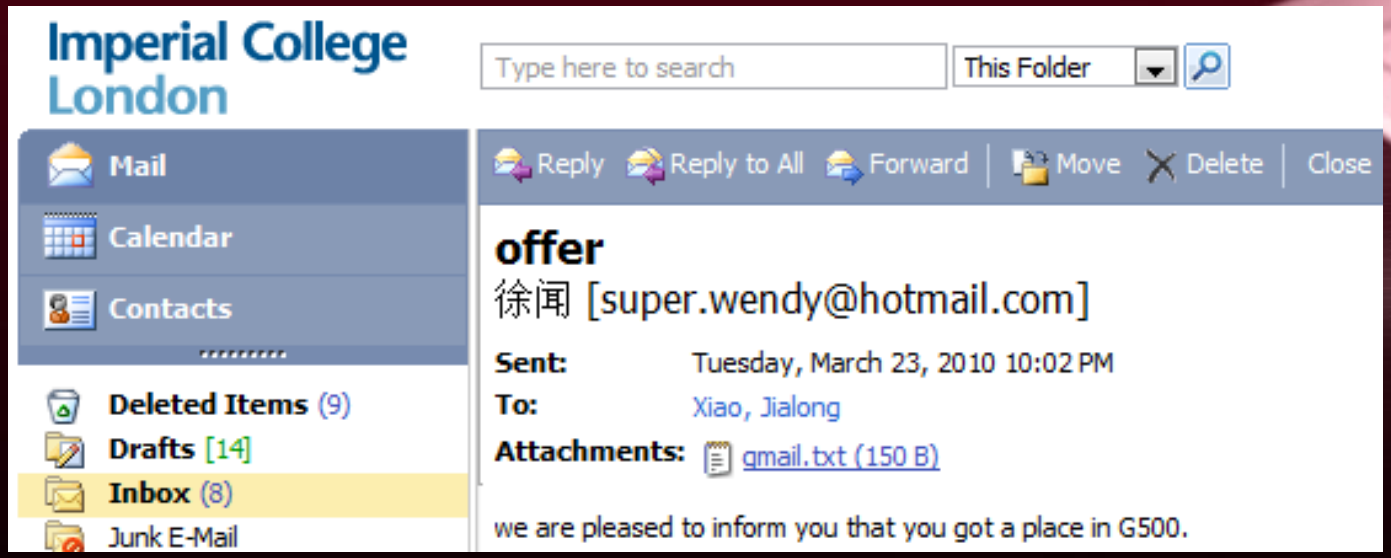
4. Automatic JavaMail-based Email generating and sending mechanism (2)



- Requirement: need to save the password of the sender email account beforehand.

MAIN FUNCTIONALITIES (Cont'd)

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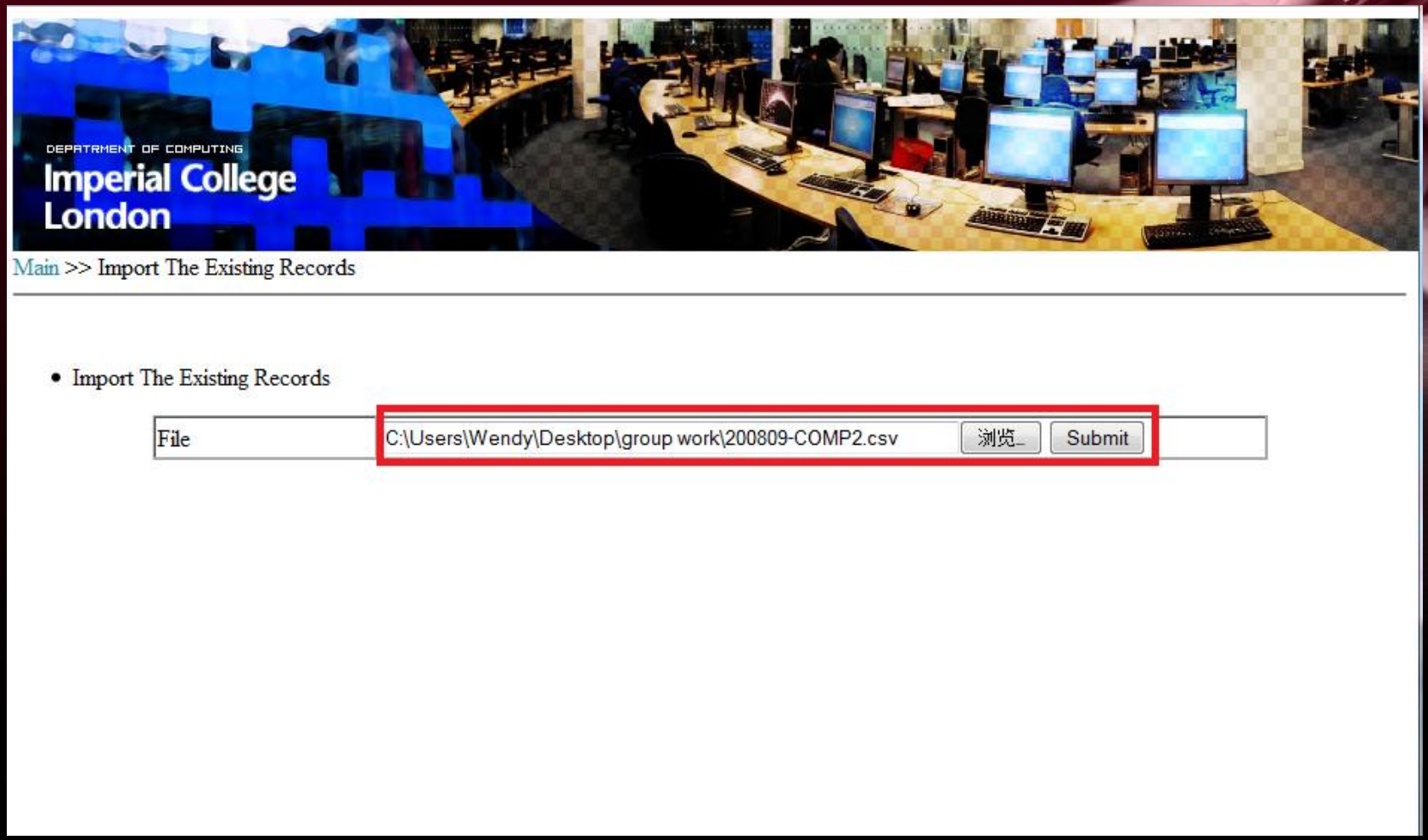
5. Import pre-existing application data from .txt or .csv files (1)



MAIN FUNCTIONALITIES (Cont'd)

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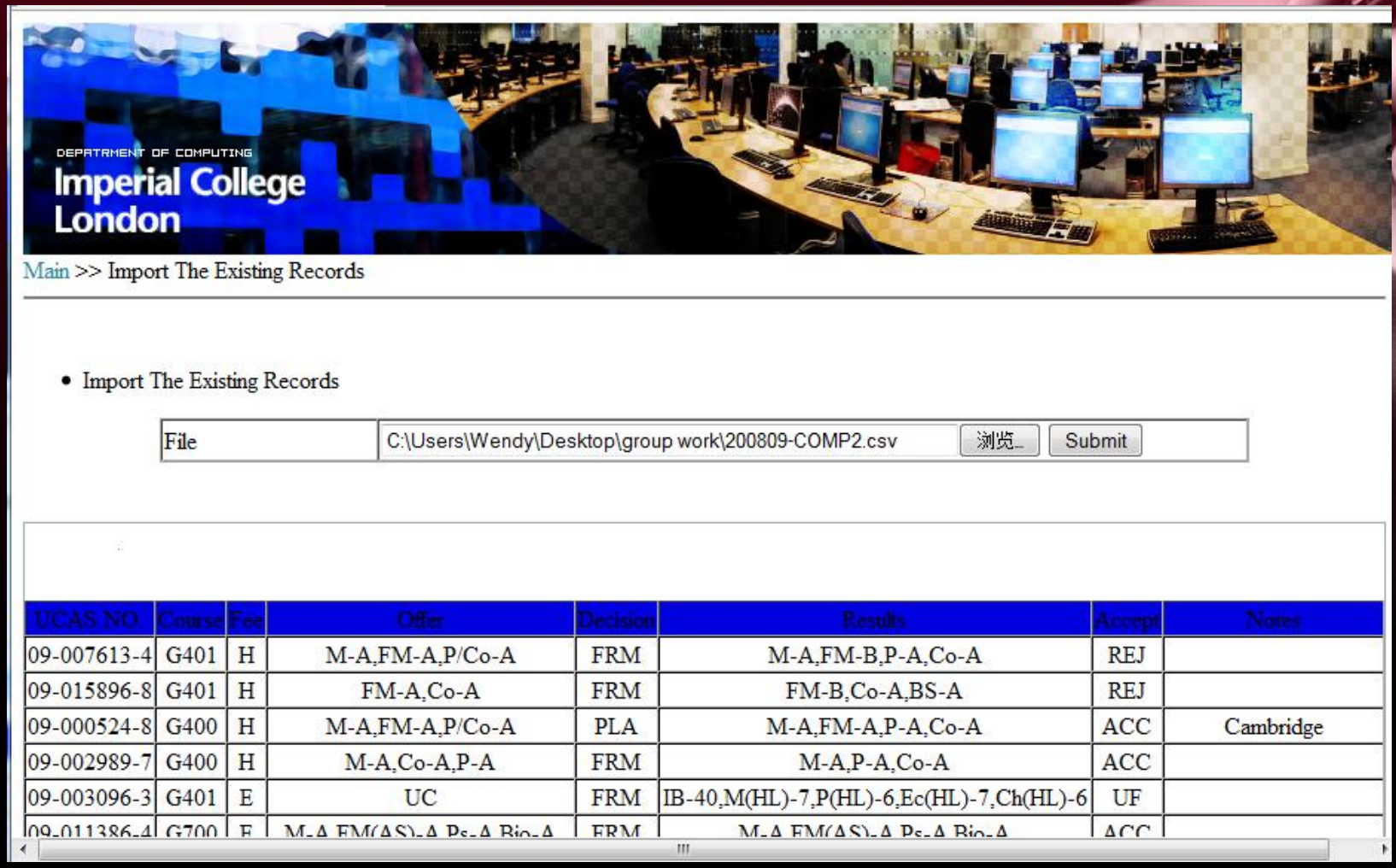
5. Import pre-existing application data from .txt or .csv files (2)



UCAS NO.	Course	Fee	Offer	Decision	Results	Accept	Notes
09-007613-4	G401	H	M-A,FM-A,P/Co-A	FRM	M-A,FM-B,P-A,Co-A	REJ	
09-015896-8	G401	H	FM-A,Co-A	FRM	FM-B,Co-A,BS-A	REJ	
09-000524-8	G400	H	M-A,FM-A,P/Co-A	PLA	M-A,FM-A,P-A,Co-A	ACC	Cambridge
09-002989-7	G400	H	M-A,Co-A,P-A	FRM	M-A,P-A,Co-A	ACC	
09-003096-3	G401	E	UC	FRM	IB-40,M(HL)-7,P(HL)-6,Ec(HL)-7,Ch(HL)-6	UF	
09-011386-4	G700	E	M-A,FM(AS)-A,Ps-A,Bio-A	FRM	M-A,FM(AS)-A,Ps-A,Bio-A	ACC	

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DEMONSTRATION OF PROCESS

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- Now, we will demonstrate the system by stimulating a typical process of use via the stance of a virtual Admission Tutor.

VULNERABILITY & FUTURE WORK

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- SQL & HTTP Session related vulnerabilities
  1) Parameter tampering
  2) SQL injection
  3) Cross-site scripting (XSS)
  4) Cross-site request forgery (CSRF)

- Browser Dependency
  1) Interface display and system response may vary when different browsers are used (IE, Firefox, Opera, …)

- Future Work
  1) More elegant package division
  2) Universal class model to handle SQL transaction
  3) Hibernate framework: Relation to Class mapping, high-level SQL template
  4) Spring plug-in: improvement in page response time

Thanks for Listening! ☺

Undergraduate Admission Portal Team