

**Teaching Allocation System (TAS)**

**Operational Concept Description**

Abbreviated Name: TAS\_OCD

Revision: V4.2

Prepared for students doing SIT321

School of Information Technology

Deakin University

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# 1 Scope

## 1.1 Identification

This Operational Concept Description applies to the Teaching Allocation System (TAS) to be developed by students doing SIT321. This document is identified by the code TAS\_OCD V4.2

## 1.2 System Overview

The Teaching Allocation System is to support teaching allocation and managed by an educational institute, such as a department/school or faculty in a university.

This is the first version of this application system although similar systems have been developed by others and may provide useful design information. This system could allocate the educational resource efficiently. It will be operated and maintained by professional staff in department/school or faculty of an educational institute.

Because the Teaching Allocation System should be developed by students doing SIT321 for assignment, the project sponsor is tutors of this unit. In addition, this system will be acquired by education institute and used by system administrator, head of institute and used by system administrator, head of institute, teaching administrator and academic staff members. It will be a system which is based on website and users can use online.

## 1.3 Document overview

This document shows important information relate to this system and describes the operational concept of the application. That is, it is an initial document describing the application. It states the requirements informally and some constraints on the implementation to be observed by the developers.

This document is subjective to being revised per the requirements from the client/users or the further discussions with the client/ users.

# 2 Referenced documents

[1] G. Strengers, 2001, ’Development of Operational Concept Description’, Australia TENIX Defence Systems, Pty Ltd, pp1-12.

[2] American Institute of Aeronautics and Astronautics, 2012, ‘Guide to the Preparation of Operational Concept Documents, American National Standard Institute, G-043A-201, pp 1-51.

[3] Project performance, 2012, ‘Operational Concept Description’, PPA-000950-10, pp 1-18.

# 3 Current system or situation

## 3.1 Background, objectives, and scope

### 3.1.1 Background

Teaching allocation and management is one of important teaching administration tasks in educational institutes. In an educational institute like a school in a university, at the end of each academic year, academic staff members are usually required to indicate the units they prefer to teach in the next academic year. With this information and the teaching allocation in the current year, the head of institute or the teaching administrator allocates teaching units to the academic staff for the next academic year.

There are many factors that affect teaching allocation. One very common factor is that two or more academic staff members would like to teach the same unit, while there are no staff members who would like to teach any units. Meanwhile, each academic staff member has a teaching load limitation, such as no more than 4 units in an academic year. Each unit must have a Unit Chair who is in charge of unit management, it allow the Unit Chair and Unit lecturer is a same person for a unit. Because of these factors, teaching allocation is a tedious and time-consuming task.

### 3.1.2 Objectives

The objectives of the current manual teaching allocation system are:

* To guarantee each unit has an academic staff member appointed as the unit lecturer;
* To ensure each unit has a unit chair (not necessarily the same as the unit lecturer);
* To allocate units to an academic staff member reasonably without exceeding his/her teaching load limitation; and
* To satisfy academic staff member’s teaching preferences to the most extent.

The current system is only working within an educational institute. People involved in the current teaching allocation system are the head of institute, teaching administrator, academic staff members, project manager, and project development team

### 3.1.3 Scope

The scope of this system includes:

* At the end of an academic year, staff members can indicate the units they prefer to teach for next academic year.
* A staff member’s teaching preferences should be recorded into database
* This system should allocate the units for staff to satisfy the preference for staff members at most extent and follow the teaching load limitation at same time.
* The teaching administrator give allocation result to staff members to confirm.
* If staff members have some suggestion, they could tell teaching administrator to adjust reasonably.

## 3.2 Operational policies and constraints

Current system allocates teaching units aromatically and is centralized. Teaching allocation must conform to the policies made by the institute and satisfy staff member’s teaching preferences to the most extent.

## 3.3 Description of current system or situation

### 3.3.1 Description

In current system, each academic staff member has a teaching load limitation each year, i.e. up to 4 units a year. Some staff members may teach fewer units. The teaching load limitation is determined by the institute beforehand. As a policy of the institute, each unit must have a lecturer and a unit chair. The unit chair is in charge of teaching management of the unit and usually the unit lecturer, but not necessarily in some cases, like the Unit lecturer is casual or a new staff, the unit lecture need to find another one.

At the end of an academic year, staff members are required to indicate the units they prefer to teach next academic year. A staff member’s teaching preferences are recorded in an Excel worksheet in which all units are listed. The preferences are indicated by numbers:

1 represents the unit that a staff member most preferred

2 represents the unit that a staff would like to teach,

3 represents the unit that staff can but does not like to teach, and

4 represents (default) the unit that a staff is unable to teach.

Staff members are encouraged to indicate preferences for as many units as possible.

The marked teaching preference worksheets are then sent back to the teaching administrator by the staff members. The teaching administrator also keeps records of current year unit teaching allocation. After the preference worksheets are collected, the head of institute or the teaching administrator allocates units to staff members following the rules below:

* If a unit has only one staff member who indicates the preference for it as 1, then the unit is allocated to this staff member provided the teaching load does not exceed the staff member’s teaching load limitation;
* If a unit has two or more staff members who indicate their preferences for it as 1, the staff member who is teaching the unit currently has a priority of teaching the unit provided his/her teaching load does not exceed the limitation;
* If a unit has two or more staff members who indicate their preferences for it as 1, but none of them is teaching the unit currently, the head of institute will negotiate/discuss with them regarding the teaching allocation and make a decision. The decision takes into account the staff members’ qualifications, previous teaching units and experience, teaching load limitation and other related factors;
* The above rules are applied to the situations where there are no staff members who indicate the preferences for a unit as 1, but there are some who indicate the preferences for it as 2; or there are no staff who indicate the preferences for it as 1 and 2, but 3;When dealing with situation for their preference for it as 1, then these two situation could follow the steps for the preference as 1 to allocate staff members.(To be specific, if a unit has only one staff member who indicate the preference for it as 2, then the unit is allocated to this staff member provide the teaching load does not exceed the staff member’s teaching load limitation. And if a unit has two or more staff members who indicate their preferences for it as 2,the staff member who is teaching the unit currently has a priority of teaching the unit provided his/her teaching load does not exceed the limitation. However, none of them is teaching the unit currently, the head of institute will discuss to adjust. ) Same way of allocation also use for situation of number 3.
* A unit for which a staff member’s preference is 4 will not be allocated to that staff member;
* Usually a unit chair is the unit lecturer who will teach that unit in the next academic year. If for some reason, such as the lecturer is a casual or new staff, he/she cannot play the role as a unit chair, the unit chair can be selected from those staff members who indicate their preference for teaching the unit (1, 2, or 3).
* If there are no such staff members, the unit lecturer will be the unit chair no matter whether he/she is a casual or new staff.
* The teaching allocation will be cross checked against staff teaching preferences and load limitations to make sure the final allocation is reasonable.
* The final allocation results will be sent to staff members for confirmation. If there are any problems, the teaching administrator or the head of institute shall adjust the allocations accordingly.

### 3.3.2 The operational environment and its characteristics

The final result of this project is a website which can be used for allocating units for staff automatically. In addition, the whole website will be uploaded to the web server of the education institute so that it can be run on either the Internet or the institute’s intranet.

### 3.3.3 Major system components and the interconnections among these components

The current system is a website which can be accessed online, it is based on web service and can achieve the data communication between server and client through internet or intranet. Therefore, there are two kinds of system components, including server and client. Users can submit their requests by client and get response form server.

### 3.3.4 Interface to external system or procedures

This system include following external interface:

* User interface
* Log in the system
* Select preference
* Check result of allocation
* Edit units information
* Database Interface
* Units information database, which should be provided by related department of education institute so that staff can search for the information of units to determine whether they prefer to choose such units
* Staff information database, which should be used for register according to staff ID

### 3.3.5 Function of current system

This system could help the teaching administrator and head of institute to allocate the staff members for next academic year efficiently. After allocation by this system, it could satisfy staff members’ preference to a great extent and follow the teaching load limitation.

### 3.3.6 Chart

* This chart shows one unit is allocated.
* Refer to appendix 1

### 3.3.7 Performance characteristics

* The speed of data processing is slow, because this system need much artificial participation.
* The amount of artificial processing is large
* Work efficiency for teaching allocation is low.

### 3.3.8 Quality attributes

* Reliability, this system include much artificial resource, so if some errors happen during allocation process, people could adjust in time.
* Maintainability, this system easy for developer to maintain.
* Complexity is low.
* Re-usability is high.

### 3.3.9 Provisions

* Information system users to implement one person one account, the user password should be strictly confidential and to be changed regularly
* The use of an information system shall not be unauthorized.
* When the system users leave the job, it is necessary to exit the system in time.
* When information of system users change, the system administrator to change or cancel the account.
* The system administrator is responsible for changing the operating rights of the system as a result of the work need to be changed.

## 3.4 Users or involved personnel

Administrator, teaching staff, the head of institute, maintainer. Academic staff members indicate and send their teaching preferences to the institute, and confirm the results. When all staff members finish sending their choices, the teaching allocation is finished. The teaching administrator or the head of institute collects staff teaching preferences, allocates teaching units, discusses issues with the staff, and adjusts the allocation results.

## 3.5 Support concept

* This document is written by one of team members
* System administrator is responsible for the data backup to ensure system security.
* System developers will test and fix on regular bugs
* The system will be run on web server of education institute
* Data will be recorded in database

# 4 Justification for and nature of changes

## 4.1 Justification for change

* Increase the speed of teaching allocation, which require system could implement teaching allocation automatically or semi-automatically under the policies set up by the institute. User could get the allocation result quickly and web interfaces are more humanize which is easy to understand and operate.
* The old system need to add the operate data manually, which have to spend a large number of time and much artificial resource. And it hard to understand for most users to operate current system. So this system could not meet users’ new requirement.

## 4.2 Description of needed changes

* Register account
* Edit information of units, including add, delete, modify.
* An algorithm for the system that could allocate teaching preference automatically.
* Add input and output interface for teaching staff members to enter information and get result.
* Email function should be added to send result.
* Back up data.

## 4.3 Priorities among the changes

* Essential:

- Edit information of units, including add, delete, modify.

- An algorithm for the system that could allocate teaching preference automatically.

* Desirable:

- Add input and output interface for teaching staff members to enter information and get result.

- Email function to send result.

* Optional:

- Back up data.

## 4.4 Changed considered but not included

Staff members and teaching administrator need to change their habit for entering their preference and getting the allocation result. This is not the functional change, so it does not include in 4.1.

## 4.5 Assumption and constraints

This system should be easy to be understood and operated for teaching staff members and the head of institute, administrators. In addition, it could solve the teaching allocation problem effectively and must follow the teaching allocation policies set up by the institute.

# 5 Concept for a new or modified system

## 5.1 Background, objectives, and scope

### 5.1.1 Background

Current manual teaching allocation system does not meet the requirements of educational institutes. A new software application system is demanded. The objectives of this new system are to implement teaching allocation automatically or semi-automatically based on the information provided by the academic staff and the policies set up by the institute.

### 5.1.2 Objectives

* To guarantee each unit has an academic staff member appointed as the unit lecturer;
* To ensure each unit has a unit chair (not necessarily the same as the unit lecturer);
* To allocate units to an academic staff member reasonably without exceeding his/her teaching load limitation; and
* To satisfy academic staff member’s teaching preferences to the most extent.

### 5.1.4 Scope

* The system operations must conform to the teaching allocation policies set up by the institute.
* Create an interface for both academic staff and administrators to log in.
* Online teaching preference submission.
* Centralized operations
* Automatic or semi-automatic teaching allocation.
* Online teaching allocation adjustment and confirmation.
* Report generation.
* Automatic retrieval and publication of statistics from managed resources
* Perform system backup and restore.

## 5.2 Operational policies and constraints

The system is to be run on the Internet/Intranet in a centralized manner, but the initial demonstration of the application may be on a standalone or isolated system. The system operations must conform to the teaching allocation policies set up by the institute.

## 5.3 Description of the new or modified systems

### 5.3.1 Description

The new system should implement teaching allocation automatically or semi-automatically in current system, each academic staff member has a teaching load limitation each year, i.e. up to 4 units a year. Some staff members may teach fewer units. The teaching load limitation is determined by the institute beforehand. As a policy of the institute, each unit must have a lecturer and a unit chair. The unit chair is in charge of teaching management of the unit and usually the unit lecturer, but not necessarily in some cases, like the Unit lecturer is casual or a new staff, the unit lecture need to find another one.

At the end of an academic year, staff members are required to indicate the units they prefer to teach next academic year. A staff member’s teaching preferences are recorded in an Excel worksheet in which all units are listed. The preferences are indicated by numbers:

1 represents the unit that a staff member most preferred

2 represents the unit that a staff would like to teach,

3 represents the unit that staff can but does not like to teach, and

4 represents (default) the unit that a staff is unable to teach.

Staff members are encouraged to indicate preferences for as many units as possible.

The marked teaching preference worksheets are then sent back to the teaching administrator by the staff members. The teaching administrator also keeps records of current year unit teaching allocation. After the preference worksheets are collected, the head of institute or the teaching administrator allocates units to staff members following the rules below:

* If there is one staff who indicates 1 for a unit, the unit should be allocated to this staff and the limitation rule should be obeyed

(staff unit & units/staff<4)

* If there are two or more staff who indicate 1 for a unit, the one who is teaching currently should be allocated to and the limitation rule should be obeyed

(staffunit & units/staff<4)

* If there are two or more staff who indicate 1 for a unit but there is no one who is teaching currently, the one who has taught this unit before will be allocated to and limitation rule should be obeyed

(staffunit & units/staff<4)

* If there are two or more staff who indicate 1 for a unit but there is no one who is teaching currently and no one has taught before, the one who has least allocated units will be allocated to and limitation rule should be obeyed

(staffunit & units/staff<4)

* If there are two or more staff who indicate 1 for a unit but there is no one who is teaching currently, no one has taught before and their allocated units are the same, system will random choose one and limitation rule should be obeyed

(staffunit & units/staff<4)

* If there is no one who indicates 1 for a unit, staff who indicate 2 or 3 should be considered and as above rules as well, limitation rule should also be obeyed

(staffunit & units/staff<4)

* If staff indicate 4 for a unit, this unit cannot be allocated to this staff

(staff ! unit)

* If all staff indicate 4 for a unit, teaching administrator should contact with staff and modify
* Casual or new staff cannot be unit lecture (staffunit lecture)
* If there is no one who indicates 1, 2 or 3 for the units, the unit lecture can be unit chair (unit lecture unit chair)

### 5.3.2 The operational environment and its characteristics

The final result of this project is a website which can be used for allocating units for staff automatically. In addition, the whole website will be uploaded to the web server of the education institute so that it can be run on either the Internet or the institute’s intranet.

### 5.3.3 Major system components and the interconnections among these components

The target system is a website which can be accessed online, it is based on web service and can achieve the data communication between server and client through internet or intranet. Therefore, there are two kinds of system components, including server and client. Users can submit their requests by client and get response form server.

### 5.3.4 Interfaces to external systems or procedures

* User Interface
* Login
* Register accounts
* Select/Change teaching preferences
* Home page
* Result/Confirmation page (+contact hours, number of lectures/pracs)
* Accounts management (Administrator, Set up/Manage accounts)
* Units management (Add/remove teaching units, \*Edit details of teaching units?)
* Verification page (Submission due date setting, Whether the allocation task is finished/All allocations are confirmed)
* Teaching allocation management(Modify/Adjust)
* Allocation reports generation (+Notify staff of the results via e-mail)
* Allocation statistics generation (Automatic retrieval and publication)
* Database Interface
* Units information database, which should be provided by related department of education institute so that staff can search for the information of units to determine whether they prefer to choose such units
* Staff information database, which should be used for register according to staff ID
* Software Interface
* Email, staff should receive emails of allocation result

### 5.3.5 Capabilities/functions of the new or modified system

The system shall be able to

* System administrator:
* allow system administrator to set up accounts for academic staff members, head of institute and teaching administrator;

* Academic staff
* allow academic staff to select and change their teaching preferences before the submission due date;
* store teaching preferences submitted by academic staff;
* allocate teaching units to academic staff automatically or semi-automatically;
* allow academic staff to confirm allocated teaching units;
* Teaching administrator
* verify whether the allocation task is finished;
* verify whether all allocations are confirmed, i.e. the allocation task is finalized;
* modify and adjust allocation results;

- generate allocation reports for all individual staff;

* generate reports of allocation statistics;
* The head of institute
* suspend and terminate accounts by the head of institute;
* add/remove teaching units;
* edit details of teaching units (e.g. contact hours, number of lectures/pracs);
* store and manage information required for teaching allocation and account management;
* perform system backup and restore.

### 5.3.6 Charts and accompanying descriptions

* Chart (Refer to appendix 2)
* Description: This chart illustrates the whole process of teaching allocation according to different roles.

### 5.3.7 Performance characteristics

* This system could allocate teaching resource effectively for the institute and satisfy teaching staff members’ preference at most extent, at the same time it follow policies of teaching load limitation of the institute.
* The speed of teaching allocation increase significantly.
* The throughput of data

### 5.3.8 Quality attributes

* Reliability, this system reduce the artificial participation, which decrease the rate of error happening significantly. Therefore this system has high reliability.
* Maintainability, this system have to equip professional maintainer to maintain. Therefore its maintainability is high.
* Complexity, this system is more complex than last system. Therefore the complexity is medium.
* Re-usability is high, the design is to be object-oriented although it may be implemented in non-object-oriented languages. The system will eventually be run on a variety of machines and operating systems. If database files are used, access to them shall be via objects which represent database tables and records.

### 5.3.9 Provisions for safety, security, privacy, and continuity of operations in emergencies

The database used for the system must be backed up periodically. More provisions are to be added following further discussions with the client/users.

## 5.4 Users/affected personnel

Academic staff, the head of institute, system administrator and teaching administrator within the institute.

## 5.5 Support concept

* This document is written by one of team members
* System administrator is responsible for the data backup to ensure system security.
* System developers will test and fix on regular bugs
* The system will be run on web server of education institute
* Data will be recorded in database

# 6 Operational scenarios

Some scenarios/use cases to be incorporated are:

## 6.1 Set up an account

System administrator sets a user name and pre-sets a password for each user of the system. The user name and password pair is sent to each user via email. The first time a user successfully logins to the system, the system prompts the user to check, change, add or confirm user account information, such as the password, personal and contact information especially the preferred e-mail address. The updated and confirmed user account information is recorded in the system and the account is finally set up. When a user is to use the system, the user must input the given user name and password to login to the system. If the input username and password do not match the existing record in the system, the system rejects the user’s access to the system and displays a message telling the reasons and asking the user to take some actions.

## 6.2 Select teaching preferences

An academic staff member logins to the system and selects teaching preferences for units. The system provides to the staff member all available teaching units, as well as the related information such as unit codes, unit names, undergraduate or postgraduate unit, and contact hours. The staff member indicates his/her preference by choosing a number 1, 2, 3 or 4 for a unit (the meanings of these numbers are the same as what are mentioned before, and no number is regarded as “4” by default). The system saves the selected preferences for the staff.

## 6.3 Update, submit and store staff teaching preferences

After an academic staff member log in to the system, the system displays all his/her selected teaching preferences. After the staff member confirms and submits the selected preferences, the system stores the submitted teaching preferences. If the staff member changes his/her mind before the submission due date, he/she can go back to the “Select teaching preferences” function to re-select units or change the selections. After the submission due date, staff members cannot make changes to teaching preferences anymore.

## 6.4 Allocate teaching units to academic staff

After the due date, the teaching administrator or the head of institute logins to the system and automatically or semi-automatically allocates teaching units to staff members based on the available information stored in the system. If the allocation of some units requires the teaching administrator or the head of institute to make decisions, the system shall display the current teaching allocation information, ask for the decisions and take actions accordingly. The system shall save the current allocation results for further adjustments or actions.

## 6.5 Generate allocation reports for individual staff members

The teaching administrator or the head of institute chooses an academic staff member and prints out or displays the teaching allocation result for the staff member. If needed, the teaching allocation result can be sent to the staff member via e-mail.

## 6.6 Suspend accounts

The head of institute can log on website backstage with his account and password which has been distributed by system administrator so he can manage the accounts of staff and delete specific accounts.

## 6.7 Login in to the system

Users input their accounts and password which have been distributed by system administrator, system will check the database to ensure whether the account is exist in database and password is correct, if the account is exist and password is correct, the home page can be shown for user. If the account is not exist, message will show to illustrate “your account is not exist”. If the account is exist but the password is not correct, message will show to illustrate “your password is wrong”.

# 7 Summary of impacts

## 7.1 Operational impacts

* In this project, users are teaching staff members, teaching administrator and the head of institute. Teaching staff members could add their preference choices to database. Teaching administrator add the whole preference report to system, which provide the statistic to allocate for system, and they receive the allocation result and modified or adjust the result. The head of institute could add, delete and change unit information of database which control the range of choices as well as terminate an account that limit the accessing.
* The acquirer is the institute, this system help institute to allocate teaching resource automatically, which reduce staffs burden at the same time, this system improve the work efficiency of the institute.
* Project team is developer, it could get experience and financial benefit by achieving various functions of this system.
* Support agencies, finance management give the financial resource and human resource management give the artificial support, and other support agencies provide the software, hardware and technician, which make the system develop formally.

## 7.2 Organizational impacts

* Users participate in this project and their responsibility is to use system in a real situation and confirm it operate formally. And if this system have some problems, users can give the feedback to developers.
* Developers are responsible for making the whole project successful.
* The acquirer institute that need to give financial support to developers.
* Other support agencies may give finance, human resource, software, hardware or technician support.

## 7.3 Impacts during development

* Users need to have a good communication with developers and indicate users’ need at front of development.
* Developers need to discuss with institute to define requirement of the project, and if some problems that are hard to solve, opportune communication is essential to adjust original plan.
* Acquirer also is the sponsor during development, so it supervises the whole system development.
* Support agencies provide various assistant including finance, human resource, software, hardware and technical skills to support system development.

# 8 Analysis of the proposed system

## 8.1 Summary of advantages

This system allocate the teaching preference automatically, which reduced working load and increased efficiency on teaching allocation, flexibility in collecting staff teaching preferences, and more helpful information about teaching allocation and management. This teaching allocation system should be performed on a single central server and multiple academic staff will use the system by connecting with the central server. In addition, this system will be popularized to various institute

## 8.2 Summary of disadvantages/limitations

* The initial system is a website and should be uploaded to web server and should be tested on personal computer, therefore, it cannot allow too much data flow at once.
* The system operations must conform to the teaching allocation policies set up by the institute.

## 8.3 Alternatives and trade-offs considered

A single central server has been considered, but it is vulnerable to overload from time to time and denial of service attacks. A stand-alone system, which will be running on a single machine rather than the network, is considered as an alternative to avoid overload and security problems on the Internet/Intranet. But some functions have to be performed manually by the teaching administrators, such as setting up accounts, collecting teaching preferences and so forth.

# 9 Notes.

* TAS – Teaching Allocation System

# 10 Appendixes

## Appendix 1

Select 1

yes

Only one people select

Select teaching preference

no

yes

Select 2

Generate preference report

no

More people select, but one people teach currently

yes

Teaching preference allocation no ni

Allocation

Complete

no

Select 3

yes

yes

no

no

Select 4

The head of institute discuss and make a decision

## Appendix 2

System administrator

Users register

Set up account

Users log in

The head of institute Academic staff Teaching administrator

Selection report

System allocation

Select preference

Terminate account

Submit report

Confirm selection

Add or delete unit

Get allocation result

Submit selection

Edit unit details

Generate unit list

Adjust result

Adjust result

Get final result

Send email

Receive email

Allocation complete