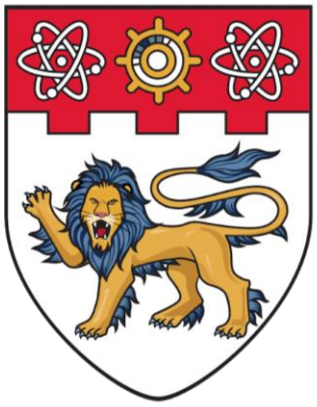

NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

AN6100 Programming Essential

Trimester 1, AY 2021/2022

Application User Manual

Class A, Group 8

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1. Purpose of our program

In view of the Covid-19 pandemic, the Singapore government requires all workplaces to be equipped with a SafeEntry system in order to keep track of workers entering the work premises for contact tracing. This program seeks to leverage both the SafeEntry token and its data collected from the SafeEntry system to help the factory track their workers' attendance coupled with the duration of work to compute overtime pay. Despite the benefits of aiding with data collation and storage, the program also seeks to help both employees and employers better manage their work hours to improve working conditions.

5 main features of the program are as follows:

1	Scan Token	Provides a list of records of the tokens scanned at the factory
2	Set Token Profile	Match entry records with the employees' details
3	Merge Input/Output Files	Captures the daily list of entry and exit timings for all employees and consolidate all the details into 1 file for each month
4	Over Time Report	Extract report for the list of employees who worked overtime on a particular day
5	Absent Report	Extract report for the list of employees who are absent from work on a particular day

The following sections will provide you with a detailed guide on how to use each of the above-mentioned features.

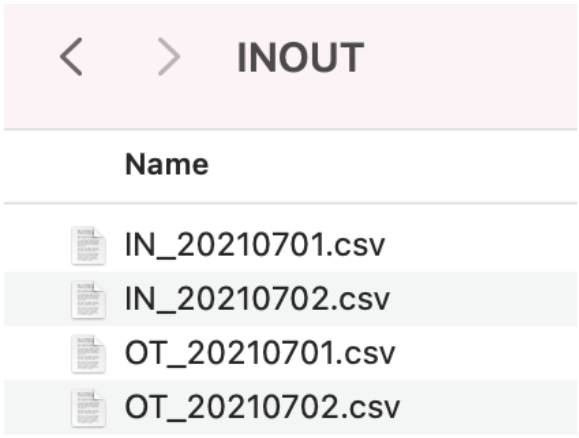
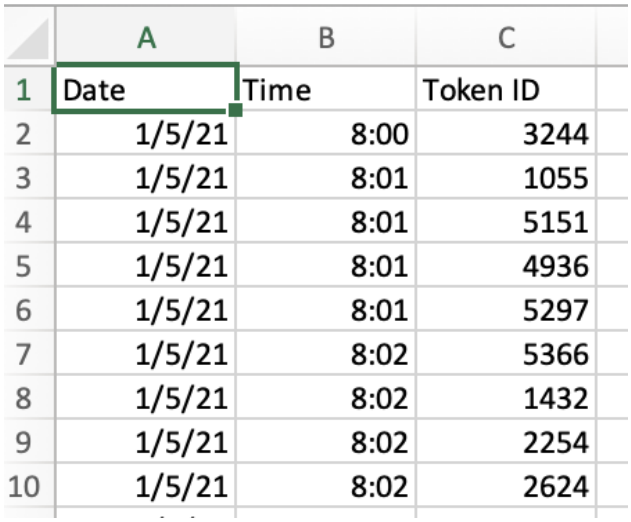
2. Scan Token

Scan Token is used to help store the records of a user whenever he scans in and out and this data would be stored in the respective CSV files along with his scan token. As per the company policy, the respective half-day schedules are as follows:

1. An employee scans in before 1300 hours will be considered as arriving at the factory, the record will be appended in the IN file
2. Employee scans after 1300 hours will be considered as leaving the factory, the record will be appended in the OT file

2.1 How to capture the scan details at entrance/exit for all employees

Select option S: Scan Token when you run the program	***** Factory Attendance ***** S: Scan Token T: Set Token Profile M: Merge Input/ Output Files O: Over Time Report A: Absent Report Q : Quit Please choose one of the above options S
Details comprising of the Date, Time, and TokenID will be captured in the IN or OT CSV files each time a token is scanned IN time: before 1300 OUT time: after 1300	This entry would be saved in the IN file: Enter simulated Token ID data (4-digits): 1245 Enter simulated in/out date (YYYY-MM-DD): 2021-05-04 Enter simulated in/out time (HH:MM): 11:40 This entry would be saved to the OT file: Enter simulated Token ID data (4-digits): 2312 Enter simulated in/out date (YYYY-MM-DD): 2021-06-23 Enter simulated in/out time (HH:MM): 15:08

INOUT folder will be created in your work directory and the list of daily IN and OT CSV files will be stored in this folder automatically	
This is a sample of how the data are captured in the CSV files	

	A	B	C
1	Date	Time	Token ID
2	1/5/21	8:00	3244
3	1/5/21	8:01	1055
4	1/5/21	8:01	5151
5	1/5/21	8:01	4936
6	1/5/21	8:01	5297
7	1/5/21	8:02	5366
8	1/5/21	8:02	1432
9	1/5/21	8:02	2254
10	1/5/21	8:02	2624

2.2 Features to note for this function

Employees are able to scan the token multiple times and all the entrance/exit records will be captured into the IN or OT file respectively.

2.3 Business implications and benefits

2.3.1 Ease of data collection

No additional manpower is required to help assist employees to scan in and out as the data would be automatically stored whenever the employee scans the token at the scanner. Employees are also not required to perform any manual attendance taking given that the token is already linked to their employee profile.

2.3.2 Reduced congestion during peak hours

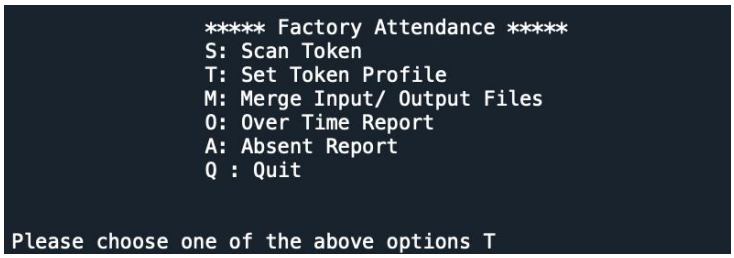
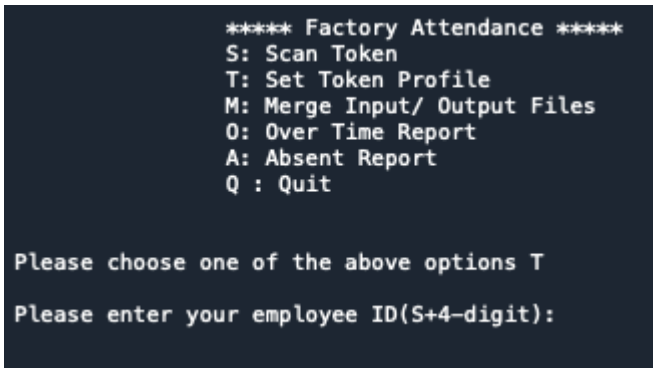
Employees are only required to scan their tokens without having to fill in their particulars which can help reduce the queues that may form especially during hours where employees start and end work.

Data is recorded almost instantaneously where minimal computation or manipulation has to be performed.

3. Set Token Profile

Set Token Profile is a database that stores all the employees' details and their corresponding TokenID. New employees of the factory are tasked to set their profiles where basic information such as the name, mobile number, email address and token ID of the employee is being stored in a CSV file (employees.csv). Should there be changes to the employee's token ID in the event of any misplaced/damaged tokens, an updated token ID for the corresponding employee will be appended in the employees.csv file.

3.1 How to set the TokenID to match the employee's details in the database

Select option T: Set Token Profile when you run the program	
You will be prompted to enter the employee ID so that the program can check if it belongs to an existing employee or not	
Enter the employee's details if it is a new employee whose employee ID is not available in the database yet	These will be the fields requiring user input for new employees: 1) Name 2) Mobile Number 3) Email 4) Token ID

	Please enter your employee ID(S+4-digit):S1001 Employee Number does not exist please enter new data. Please enter your name:Jason Please enter your mobile number(8 digits begin with '8' or '9'):91234554 Please enter your EMail(must have @):jason@msba.com Enter simulated Token ID data (4-digits): 5672 Successfully added into employees.csv
Otherwise, display the details of the existing employee	These are the relevant information presented on the console for an existing employee Please enter your employee ID(S+4-digit):S0002 EmployeeID Name MobileNumber EMail TokenID S0002 Ali 89839169 S0002@msba.com.sg 5451 Do you want to update this profile? [Y/N] Y
Updating of profile for existing employee	If user chooses Y - he will be prompted the following: Do you want to update this profile? [Y/N] Y Please enter your name:Ali Please enter your mobile number(8 digits begin with '8' or '9'):91234567 Please enter your EMail(must have @):S0002@msba.com.sg Enter simulated Token ID data (4-digits): 3421 Successfully added into employees.csv If user chooses N - he will be brought back to the menu: Do you want to update this profile? [Y/N] N ***** Factory Attendance ***** S: Scan Token T: Set Token Profile M: Merge Input/ Output Files O: Over Time Report A: Absent Report Q: Quit
This is a sample of the details stored in the employees.csv file	A B C D E EmployeeID Name MobileNumber EMail TokenID S0797 Staff with ID 85009311 S0797@msb 3825 S0798 Staff with ID 86162418 S0798@msb 2809 S0799 Staff with ID 95683450 S0799@msb 2838 S0800 Staff with ID 97930880 S0800@msb 4310 S0801 Bobby lim 91237654 bobbylim@r 5621

3.2 Features to note for this function

We have assumed that an existing “employees.csv” has been stored in your work directory.

In the event an employee loses his original token and obtains a new replacement token, a new row of data containing his personal details and the new TokenID will be appended in the employees.csv file. This will ensure that the updated TokenID will be matched with the correct employee details when he uses his new token to scan his entry/exit at the factory subsequently. The employees.csv file will not be sorted as it is crucial for the entries to be stored in accordance to the time it was added to the file to prevent any mismatches while generating the Overtime and Absent reports in the later stages.

3.3 Business implications and benefits

3.3.1 Instantaneous retrieval of the database of relevant information

Employee information can be easily accessed in the file where necessary changes can be made or when a new employee joins.

Information of each employee is stored in one homogenous and centralised location, hence the time spent on searching the file that stores information of the employee is greatly reduced and changes will only be made to one specific file.

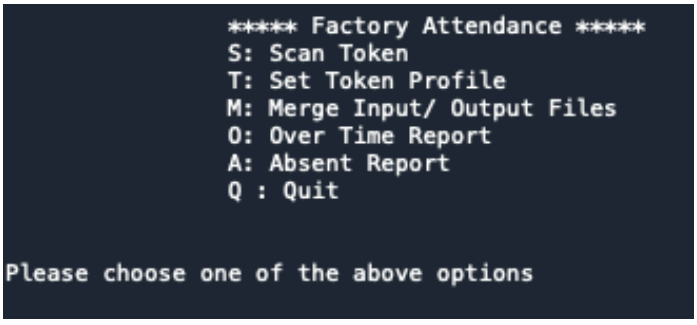
4. Merge Input/Output Files

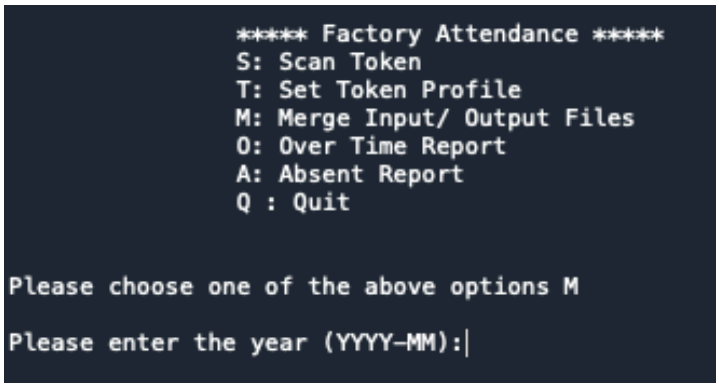
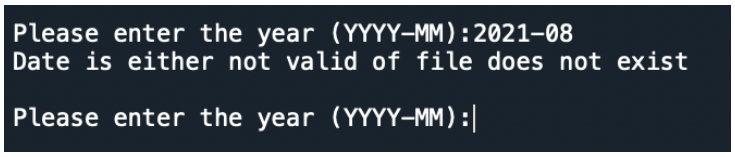
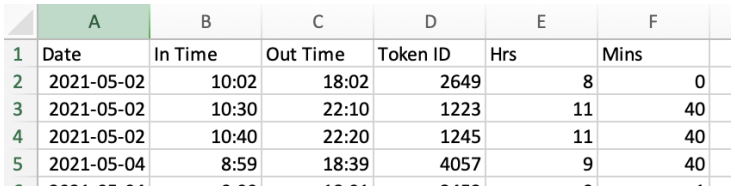
Merge Input/Output Files act as an overarching umbrella that will consolidate all the daily scanned entrances and exits and merge them into 1 CSV file for each month based on the user's input. Data files produced will contain all working days in that particular month where the working hours of employees are computed based on the In and Out timings.

Due to the sensitivity of the scanning machines, the following assumptions will be taken to help reduce confusion:

1. Should employees forget to scan in, the default time would be: 1259 hours
2. Should employees forget to scan out, the default time would be: 1400 hours
3. The earliest scan in timing would be recorded as the actual time of reporting to work if multiple scan ins are detected during the day
4. The latest scan out timing would be recorded as the actual time of leaving work if multiple scan outs are detected on that day

<u>4.1 How to obtain the merged CSV file for a particular month</u>

Select Option M: Merge Input/Output Files	

You will be prompted to enter the year and month (all numeric) that you would like to merge the data in	
If the date entered is invalid (no IN/OUT files corresponding to the month entered), user will be prompted to re-enter the date	
The merged CSV file for the month will be created automatically in your work directory with the filename format as MG_YYYYMM.csv	
The data captured in the merged CSV file will consist of the entrance/exit time as well as the duration at work (including lunch hour) per TokenID per day	This is a sample of the data recorded in the merged CSV file 

	A	B	C	D	E	F
1	Date	In Time	Out Time	Token ID	Hrs	Mins
2	2021-05-02	10:02	18:02	2649	8	0
3	2021-05-02	10:30	22:10	1223	11	40
4	2021-05-02	10:40	22:20	1245	11	40
5	2021-05-04	8:59	18:39	4057	9	40

4.2 Features to note for this function

In the event where the year/month entered does not contain any IN/OUT files, users will be prompted to enter another year/month to merge the files together.

During the merger, only the earliest scan in timing and the latest scan out timing will be saved per employee for each day to ensure that the working hours are recorded correctly.

This report must be generated first before the subsequent features of extracting the Overtime Report and Absent Report can be used in the later section of this manual.

4.3 Business implications and benefits

4.3.1 Increased accessibility to working hours

This report can be generated as long as there are existing entries for both the IN/OUT files of the month entered by the users and there is no need to wait till the end of the month before collating the work hours.

Users can churn the report even on a daily basis and the file would contain all entries until the most recent date available for the specific month.

5. Over Time Report

The overtime report is generated based on the specific date entered by the user and this will present the user with a list of employees who have successfully met the criteria that counts towards overtime:

1. The employee stays for at least 9 hours and 15 mins at work

5.1 How to generate the over time report for employees for a particular day

<table>
<tr><td>Select Option O: Over Time Report when you run the program</td><td>

```
***** Factory Attendance *****
S: Scan Token
T: Set Token Profile
M: Merge Input/ Output Files
O: Over Time Report
A: Absent Report
Q : Quit

Please choose one of the above options O
```

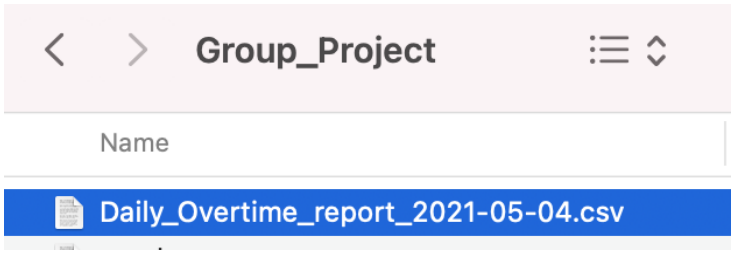
</td></tr>
<tr><td>You will be prompted to enter the date (all numeric) that you would like to generate the Over Time Report for in YYYY-MM-DD format</td><td>If an invalid date is entered, the user will be prompted to re-enter the date:

```
Enter simulated in/out date (YYYY-MM-DD): 2021-08-23
Date entered needs to be before today.

Enter simulated in/out date (YYYY-MM-DD): 2021-05-04
```

</td></tr>
<tr><td>The report would be generated and printed on the user interface</td><td>

```
Over Time List For 2021-05-04
  EmployeeID                Name              Work  Overtime in mins
3      S0001           Peter Lim  11 Hours 40 Mins               160
4      S0099  Staff with ID S0099   9 Hours 40 Mins                40
```

</td></tr>
<tr><td>The report would also be automatically created and saved as a CSV file in your work directory with the filename format as Daily_Overtime_report_YYYY-MM-DD.csv</td><td> 
</td></tr>
<tr><td>The report generated will contain information on the EmployeeID, Name, Work (total hours worked for the day) as well as the Overtime in mins.</td><td>

A	B	C	D
EmployeeID	Name	Work	Overtime in mins
S0001	Peter Lim	11 Hours 40 Mins	160
S0099	Staff with ID S0099	9 Hours 40 Mins	40

</td></tr>
</table>

5.2 Features to note for this function

This report would only be generated if the merged file has been generated by "M: Merge Input/ Output Files" and can only be generated for dates before today's date given that it is inaccurate to generate/predict overtime hours for the future.

We have assumed that the Over Time report file will be generated on a daily basis and any employees with a replacement TokenID will be captured correctly. This is to ensure that even with the change of TokenID, we are still able to track employees based on their TokenIDs of that particular day.

5.3 Business implications and benefits

5.3.1 Reduce human errors

The program would be less susceptible to making errors when calculating overtime hours, making it fair for both employees and employers when calculating salaries and wages. There would be minimum miscalculations in this manner.

Moreover, given that the report generated is for a particular day, employees are also able to make verifications the next day to ensure that all information is accurate.

5.3.2 Productivity and planning of resources

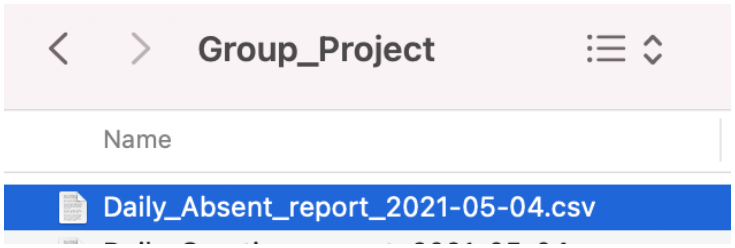
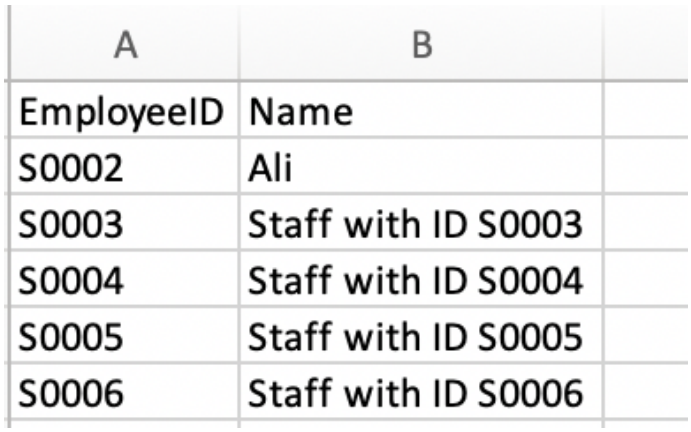
Management may use this report to help them manage the productivity level of each employee and better plan for manpower resources if required. For instance, management can observe the overtime trend based on the report and if there is a particular month where almost all employees have to work overtime, they can consider hiring temporary staff to help offload the work based on business needs.

6. Absent Report

The absent report is generated based on the user's input to help identify and highlight workers who had not scanned in and out for a particular day. These workers would thus be marked absent when checked against the employee's attendance list.

6.1 How to generate the report of the list of employees absent on a particular day

Select option A: Absent Report when you run the program	***** Factory Attendance ***** S: Scan Token T: Set Token Profile M: Merge Input/ Output Files O: Over Time Report A: Absent Report Q : Quit Please choose one of the above options A
You will be prompted to enter the date (all numeric) that you would like to generate the Absent Report for in YYYY-MM-DD format	If an invalid date is entered, the user will be prompted to re-enter the date: Enter simulated in/out date (YYYY-MM-DD): 2021-08-23 Date entered needs to be before today. Enter simulated in/out date (YYYY-MM-DD): 2021-05-04
The report would be generated and printed on the user interface	Absent List For 2021-05-04 EmployeeID Name 1 S0002 Ali 2 S0003 Staff with ID S0003 3 S0004 Staff with ID S0004 4 S0005 Staff with ID S0005 5 S0006 Staff with ID S0006 .. .. 795 S0796 Staff with ID S0796 796 S0797 Staff with ID S0797 797 S0798 Staff with ID S0798 798 S0799 Staff with ID S0799 799 S0800 Staff with ID S0800 [797 rows x 2 columns]

The report would also be automatically created and saved as a CSV file in your work directory with the filename format as Daily_Absent_report_YYYY-MM-DD.csv	
This file will consist of the employee ID and the corresponding employee name of those who are absent from work on the particular date	

A	B
EmployeeID	Name
S0002	Ali
S0003	Staff with ID S0003
S0004	Staff with ID S0004
S0005	Staff with ID S0005
S0006	Staff with ID S0006

6.2 Features to note for this function

Similarly, the Absent report would only be generated if the merged file has been generated by "M: Merge Input/ Output Files" and can only be generated for dates before today's date.

We have assumed that the Absent report file will be generated on a daily basis and any employees with a replacement TokenID will be captured correctly. This is to ensure that even with the change of TokenID, we are still able to track employees based on their TokenIDs of that particular day.

The program would not be able to generate an absent list for future dates even if the employee has already applied for leave for the particular day.

6.3 Business implications and benefits

6.3.1 Increased transparency in the workplace

The company may use this absent report to match with the leave application system to ensure that the employees have utilised their entitled leave correctly or if the employees have been absent from work without a valid reason. The management will be able to identify employees who are constantly absent without valid reason and take the necessary disciplinary action.