Coding exercise - monthly pay calculation

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Analysis and assumptions

Extracting requirement

Here are basic understandings from the requirement.

- User provides annual salary, superannuation rate, and date period to get payslip results.
- User also provide employee names, each associates to a calculation result.
- The annual salary must be positive, possibly in currency format.
- The superannuation rate is between 0% - 50% inclusive.
- The ATO tax rates used for calculation is based on the date period provided.
- Calculation results are rounded to the nearest whole dollar.

Assumption on date and period

- We only need support monthly payment calculation. Weekly or fortnightly are not required.
- The provided date period should represents a full month period. For example, 1 Mar 2016 - 31 Mar 2016 is valid for representing March this year, while 1 Mar 2016 - 20 Mar 2016 would be invalid because it represents a partial month.
- Periods without specifying a year may still be valid, for example, 1 Mar - 31 Mar would be treated as March in the current year automatically.
- Most likely we only need support calculation for the current tax year. As the current ATO tax rates are the same between *1 July 2014* and *30 Jun 2017*, so these dates become the supported start date and end date.

About individual tax rates

Starting from 1 July 2014, taxpayers with top income of $180,001 or more will have additional tax withheld by their employer. This is due to the Temporary Budget Repair Levy. So below tax rates will be used instead of those listed in the requirement. Also refer to this source.

Start date	Threshold	Base tax	Excess rate	Comment
1 July 2014	**180,001**	**54,547**	**47.0%**	includes 2% Temporary Budget Repair Levy
1 July 2014	**80,001**	**17,547**	**37.0%**	
1 July 2014	**37,001**	**3,572**	**32.5%**	
1 July 2014	**18,201**	**0**	**19.0%**	
1 July 2014	**0**	**0**	**0%**	
1 July 2017	180,001	54,547	45.0%	To be reviewed
1 July 2017	80,001	17,547	37.0%	To be reviewed
1 July 2017	37,001	3,572	32.5%	To be reviewed
1 July 2017	18,201	0	19.0%	To be reviewed
1 July 2017	0	0	0%	To be reviewed
…	…	…	…	

Ideally, these tax rates should be stored as a look up table in a database, or getting from a web API. For this exercise, we will simply use a JSON array that behind a mocked API.

About superannuation guarantee rate

There is an official Superannuation Guarantee rate that every employer should follow. Effective since 1 July 2014, this rate is set as 9.5%. We will have below according to this source.

Start date	Superannuation Guarantee rate	Comment
1 July 2014	**9.5%**	
1 July 2021	10.0%	To be reviewed
1 July 2022	10.5%	To be reviewed
…	…	

The assumption is that the application should warn user when a lower rate is used.

Assumptions on rounding

When calculating taxable income and tax withheld amounts, ATO generally prefer round down rather than round to the nearest dollar. For this exercise, we will use below guidelines:

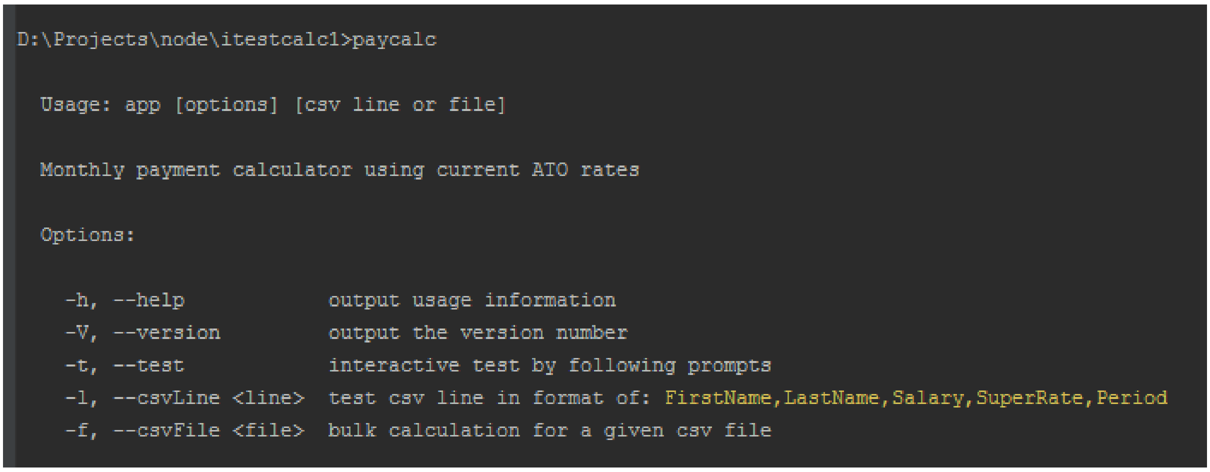
- Round down when calculating the monthly taxable income.
- Round to nearest dollar when calculating the tax withheld amount.
- Round down when calculating the superannuation amount.

Other business considerations

- User will need both single and bulk calculations, where the bulk mode is processing a csv file.
- Each csv entry should be in format of:
  - <FirstName>,<LastName>,<Salary>,<SuperRate>,<Period>
- We are not expecting very large csv file, as number of employees in a small business is typically less than 1,000.
- For this exercise, we will not consider other situations that could affect the actual monthly pay calculation, examples are:
  - Tax offsets
  - Medicare levy exemptions
  - Study Loans

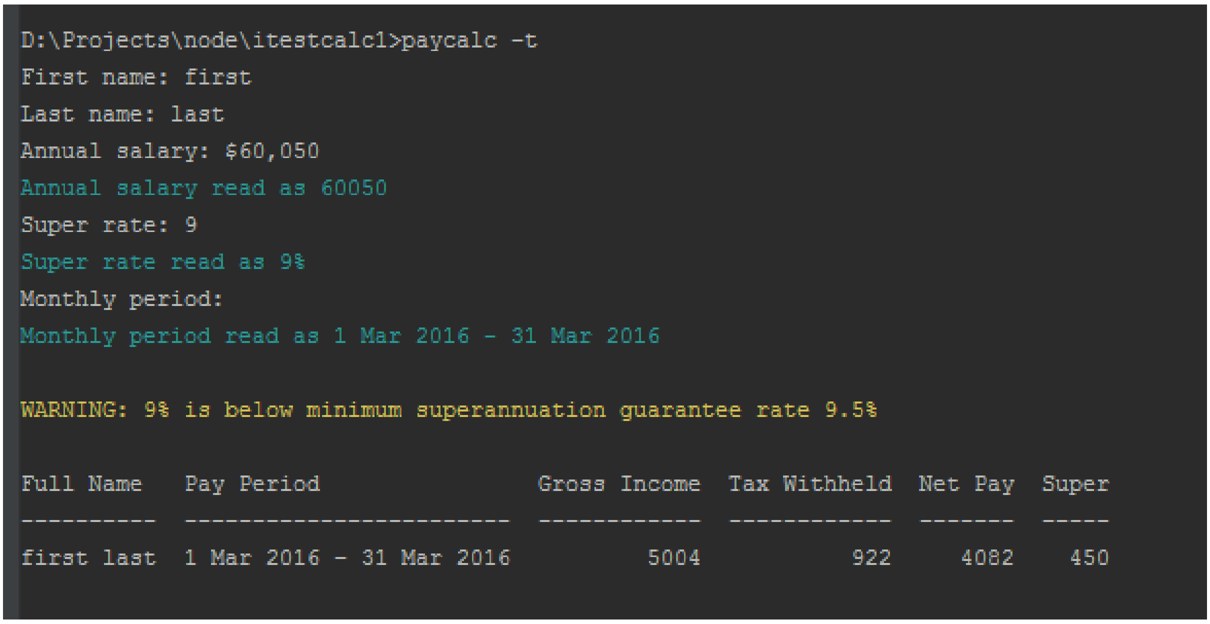
How to run the application

Refer to https://github.com/seanliu2012/itestcalc1. After running `npm link`, we can run **`paycalc`** command directly instead of **`node ./src/app.js`**.

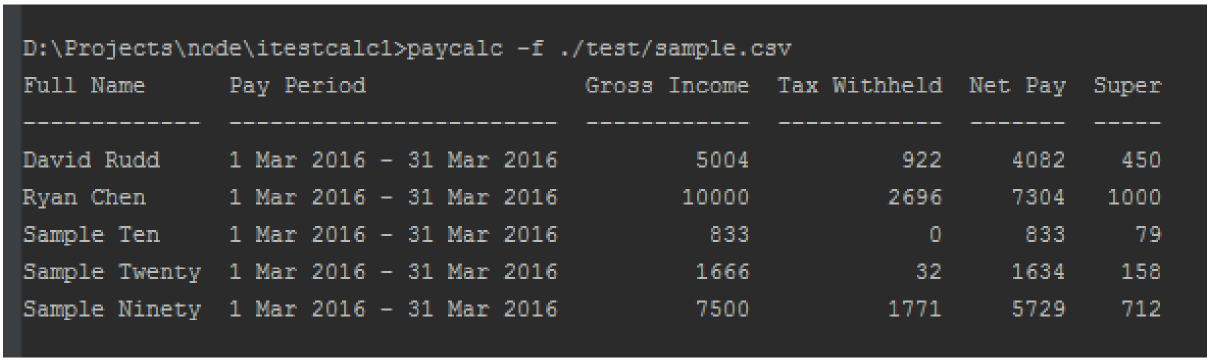


```
D:\Projects\node\itestcalc1>paycalc

  Usage: app [options] [csv line or file]

  Monthly payment calculator using current ATO rates

  Options:

    -h, --help           output usage information
    -V, --version        output the version number
    -t, --test           interactive test by following prompts
    -l, --csvLine <line>  test csv line in format of: FirstName,LastName,Salary,SuperRate,Period
    -f, --csvFile <file>  bulk calculation for a given csv file
```

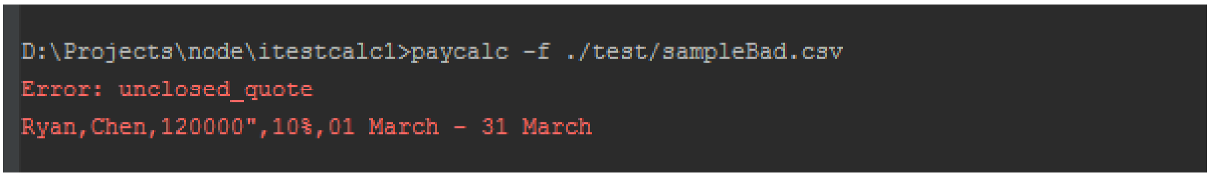
Test harness and sample outputs



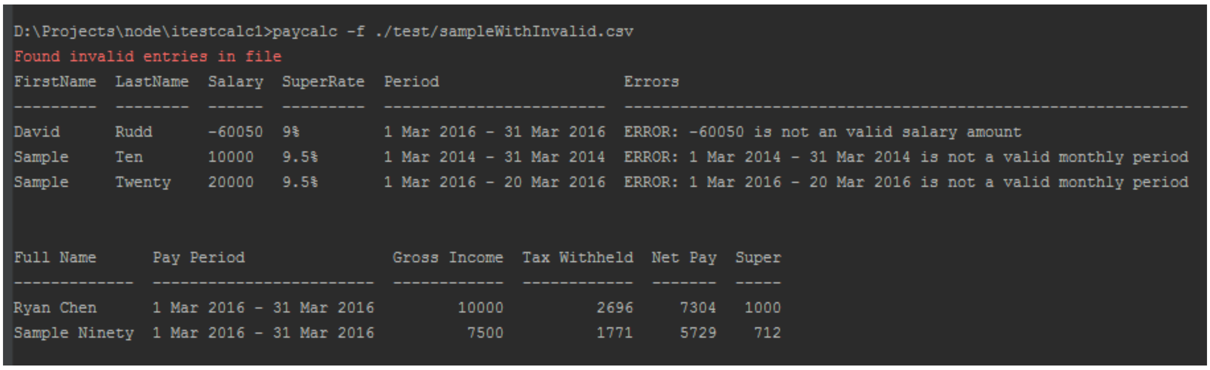
```
D:\Projects\node\itestcalc1>paycalc -t
First name: first
Last name: last
Annual salary: $60,050
Annual salary read as 60050
Super rate: 9
Super rate read as 9%
Monthly period:
Monthly period read as 1 Mar 2016 - 31 Mar 2016

WARNING: 9% is below minimum superannuation guarantee rate 9.5%

Full Name   Pay Period                Gross Income  Tax Withheld  Net Pay  Super
----------  ------------------------  ------------  ------------  -------  -----
first last  1 Mar 2016 - 31 Mar 2016          5004           922     4082    450
```



```
D:\Projects\node\itestcalc1>paycalc -f ./test/sample.csv
Full Name      Pay Period                Gross Income  Tax Withheld  Net Pay  Super
-------------  ------------------------  ------------  ------------  -------  -----
David Rudd     1 Mar 2016 - 31 Mar 2016          5004           922     4082    450
Ryan Chen      1 Mar 2016 - 31 Mar 2016         10000          2696     7304   1000
Sample Ten     1 Mar 2016 - 31 Mar 2016           833             0      833     79
Sample Twenty  1 Mar 2016 - 31 Mar 2016          1666            32     1634    158
Sample Ninety  1 Mar 2016 - 31 Mar 2016          7500          1771     5729    712
```



```
D:\Projects\node\itestcalc1>paycalc -f ./test/sampleBad.csv
Error: unclosed_quote
Ryan,Chen,120000",10%,01 March - 31 March
```



```
D:\Projects\node\itestcalc1>paycalc -f ./test/sampleWithInvalid.csv
Found invalid entries in file
FirstName  LastName  Salary  SuperRate  Period                    Errors
---------  --------  ------  ---------  ------------------------  ---------------------------------------------------------------
David      Rudd      -60050  9%         1 Mar 2016 - 31 Mar 2016  ERROR: -60050 is not an valid salary amount
Sample     Ten       10000   9.5%       1 Mar 2014 - 31 Mar 2014  ERROR: 1 Mar 2014 - 31 Mar 2014 is not a valid monthly period
Sample     Twenty    20000   9.5%       1 Mar 2016 - 20 Mar 2016  ERROR: 1 Mar 2016 - 20 Mar 2016 is not a valid monthly period


Full Name      Pay Period                Gross Income  Tax Withheld  Net Pay  Super
-------------  ------------------------  ------------  ------------  -------  -----
Ryan Chen      1 Mar 2016 - 31 Mar 2016         10000          2696     7304   1000
Sample Ninety  1 Mar 2016 - 31 Mar 2016          7500          1771     5729    712
```