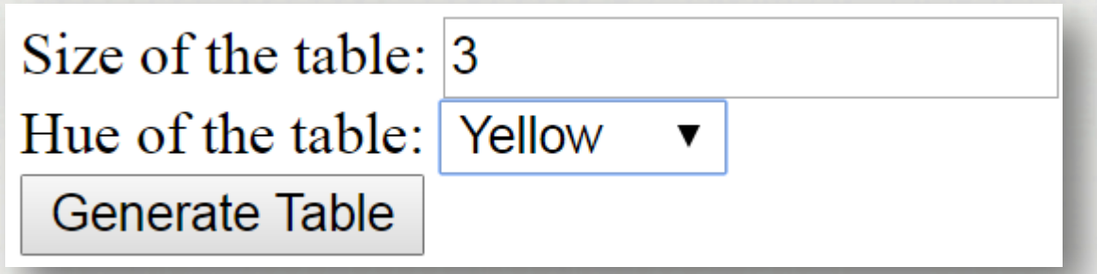
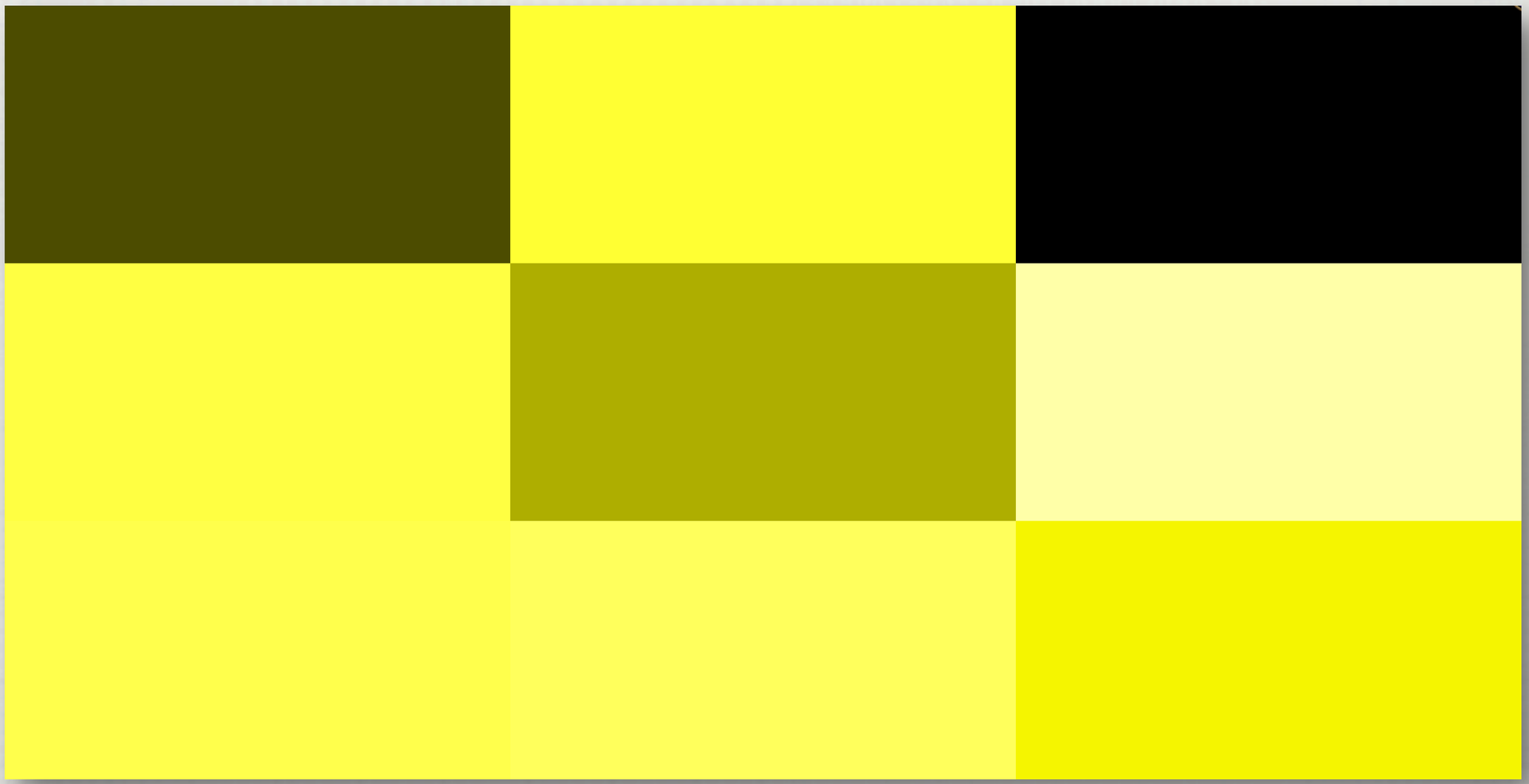
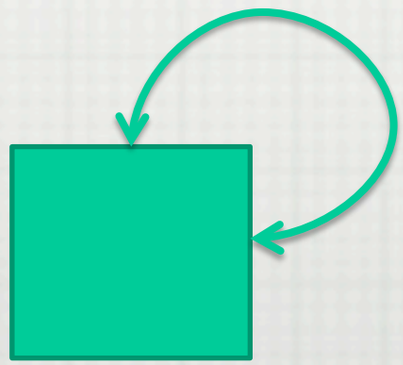
Exercise B3 – recap the Web communication





Recap the Web communication

- Why there is no result by clicking ‘generating’
  - Client/Server protocol - HTML itself is for representation (no communication)
- Who is the server; who is the client?
  - https://unimelb.edu.au/global/contact-maps.html
  - http://localhost/form.html
- We are actually simulating the C/S communication locally
  - By using what?



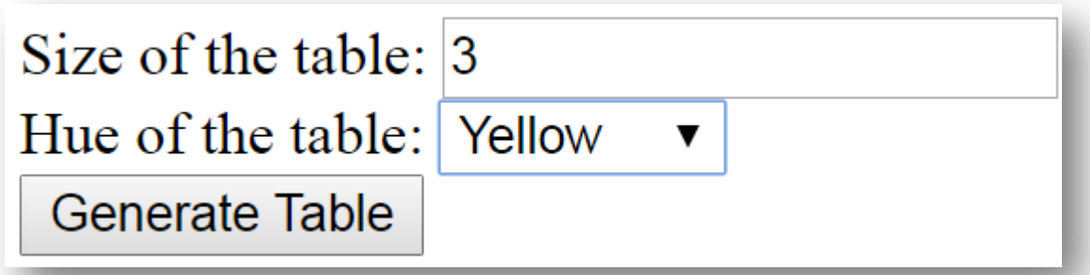
You (Server/Client)

Client: Request web page with given ‘hue’ and ‘size’

Server: process and generate HTML and CSS for you

……

Client: Yes, now I can see the results




```html
<!DOCTYPE html>
<html>
<body>
<form method="post" action="table-generator">
    Size of the table: <input type="text" name="size"><br />
    Hue of the table:
    <select name="hue">
        <option value="0">Red</option>
        <option value="60">Yellow</option>
        <option value="120">Green</option>
        <option value="180">Cyan</option>
        <option value="240">Blue</option>
        <option value="300">Magenta</option>
    </select><br />
    <input type="submit" value="Generate Table">
</form>
</body>
</html>
```

Client: browsing the information and sending requests (interactive functions)

```python
@app.route("/table-generator", methods=['POST'])
def root():
  styles, rows = process()
  html = '''
  <!DOCTYPE html>
  <html>
  <head>
      <style>%s</style>
  </head>
  <body>
  <table>
      <tbody>%s</tbody>
  </table>
  </body>
  </html>''' % (styles, rows)
  return html, 200, {'Content-Type': 'text/html; charset=utf-8'}


if __name__ == "__main__":
    app.run(debug=True, host='127.0.0.1', port=80)
```

Server function: generating the HTML/CSS for clients

“server function” - generate the table

```
@app.route("/table-generator", methods=['POST'])
def root():
    styles, rows = process()
    html = '''
    <!DOCTYPE html>
    <html>
    <head>
        <style>%s</style>
    </head>
    <body>
    <table>
        <tbody>%s</tbody>
    </table>
    </body>
    </html>''' % (styles, rows)
    return html, 200, {'Content-Type': 'text/html; charset=utf-8'}
```

Process() –return CSS and HTML strings

```
def process():
  styles = '''
  html, body, table {
    width: 100%;
    height: 100%;
    margin: 0;
  }

  table {
    border-spacing: 0;
  }'''
  size = int(request.form['size'] or 3)
  hue = int(request.form['hue'] or 0)
  rows = ''
  for i in range(1, size + 1):
      rows += '<tr>'
      for j in range(1, size + 1):
          rows += '<td></td>'
          h = hue
          s = 100
          l = int(random.random() * 100)
          color = 'hsl(%d, %d%%, %d%%)' % (h, s, l)
          styles += 'tr:nth-child(%d) td:nth-child(%d) { background-color: %s; }' % (i, j, color)
      rows += '</tr>'
  return styles, rows
```

Spreadsheet Workshop

INFO20002: Foundation of Informatics

Dept of Computing and Information Systems
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Contents

- **Phase 1 project marking feedback (Ongoing - Benchmark)**
- **Spreadsheet manipulation:**
  - **Google Sheets (Hands-on Part0 - Part2)**
  - **Useful functions – Aggregation, Filter, Sort, ARRAYFORMULA etc.**

The secret of dynamic - Formulas

- A formula is constructed from literals, operators, functions, and cell references
- Starts with ‘=‘ (equal sign) and a combination of **literals**, **operators**, **cell references** and **functions**
- Examples:
  - =1+2*3
  - =A1+2
  - =SUM(1,2,3)
  - =COUNT(A1: A10)

Exercise 1-“Fill handle”

1. New a ***sheet1.xlsx*** on google SpreadSheet
2. *Put ‘1’ in A1*
3. *Put ‘=A1+1’ in cell B1*
4. *Put “=B1& ‘ is two’” in cell C1*
5. *Drag the cursor (cross hair cursor) from A1 to A5 – why?*
6. *Drag the cursor (cross hair cursor) from B1 to B7 – why?*

Can you see the difference between ‘B5’ and ‘B7’ ? Why?

Cell Reference

Relative Cell Reference: **A1**

Cell references change by using fill handle (dragging the cursor)

Absolute Cell Reference: **A1**

Cell references do not change by fill handle

Mixed: **$A1**

Cell references partially change

which part?

how to fix the row?

Exercise 2- Cell Reference

1. Based on ***sheet1.xlsx***
2. *Put a list of number from 1 to 10 in a range A1:A10*
3. *Put the '=A1+1' in cell B1*
4. *Drag the cursor (cross hair cursor) from B1 to B10*
5. *Replace B1 formula with **"=A1+1"***
6. *Drag the cursor (cross hair cursor) from B1 to B10*
7. *Why are the results different from the last time?*

*8. Can you realise the **Fibonacci sequence** in sheet1.xlsx*

Fibonacci sequence – the first and second number is 0 and 1, and each of the remaining numbers is the sum of the previous two, i.e. 0, 1, 1, 2, 3, 5, 8……

VLookup

VLOOKUP(lookup_value; table_array; col_index_num; [range_lookup])
Looks for a value in the leftmost column, and then returns a value (from index column) at the same row
=VLOOKUP(“apple”, A1:D40, 3, False)

- TRUE assumes the first column in the table is sorted either numerically or alphabetically, and will then search for the closest value. This is the default method if you don't specify one.
- FALSE searches for the exact value in the first column.
- **It is noted that the “look_value” has to be the value of the first column of the “table_array”**

Exercise 3- Lookup

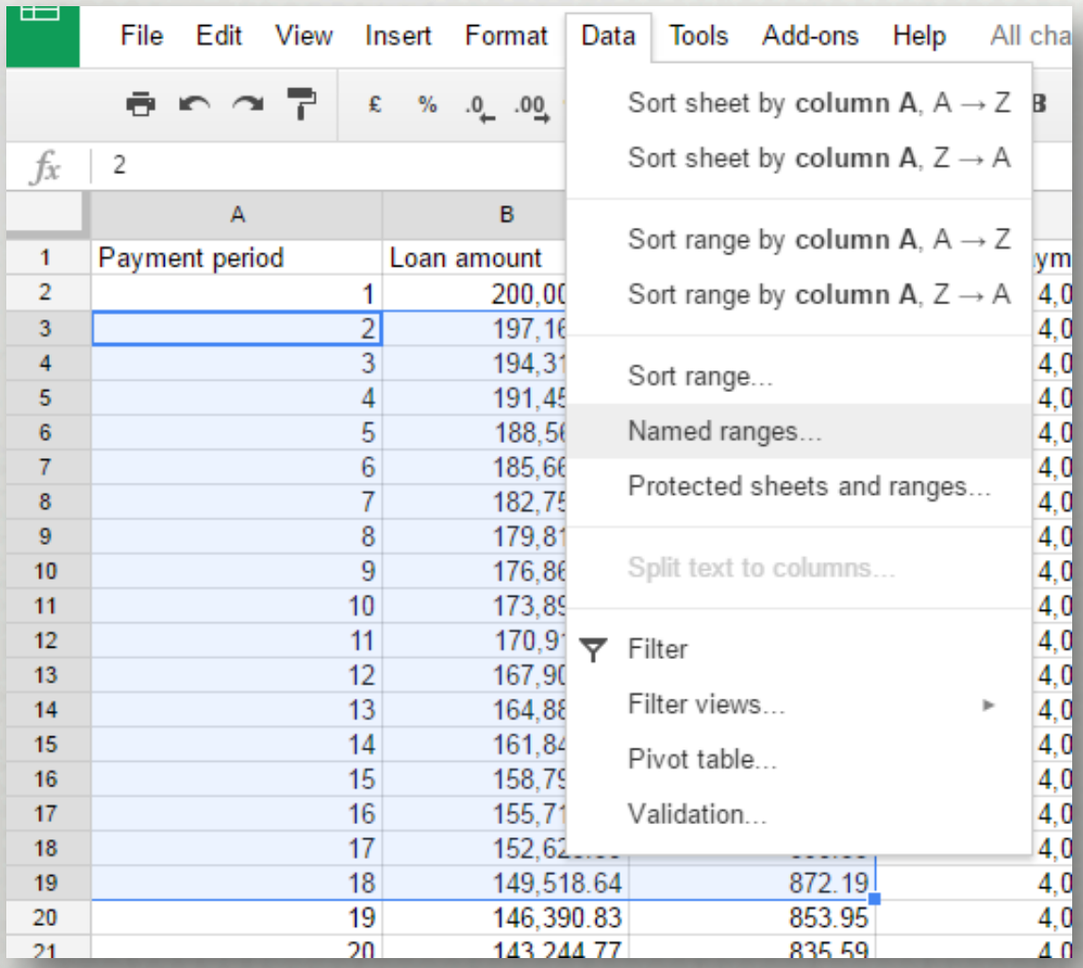
Find the example data under the **Lookup** with '**Products**' and '**Tom shopping invoice**'. See the formula of **D2** in the 'Tom shopping invoice'

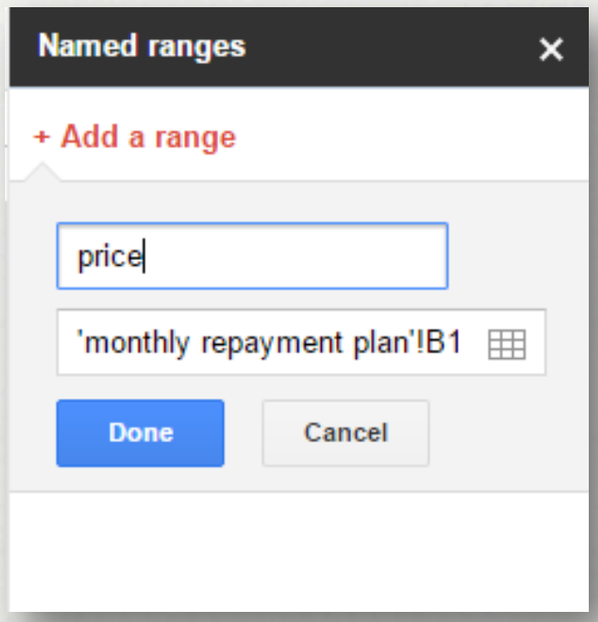
1. *Add 2 new products in the products sheet (you name it)*
2. *Then add one of these two products to the second sheet*
3. *Update the **lookup formula** in column C and D*
4. *Revise other related formula to reflect the updated values for the **total amount** and **grand total***

Name range

Have you notice that you actually did a lot of duplicate work once updating the formula of a range of cells?

Name range – avoid the duplicate work by naming a range of cells (dealing the cells of the same range)





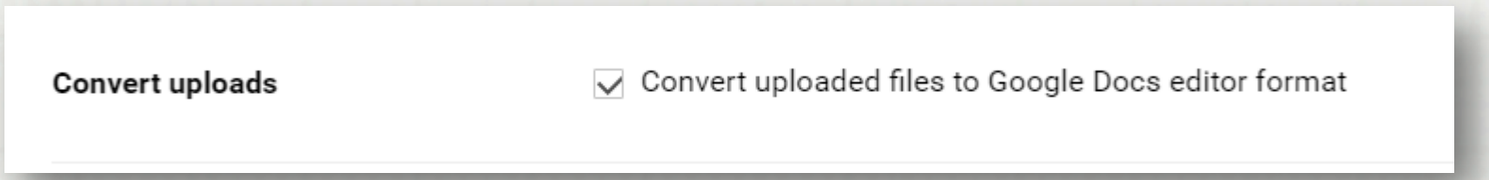
Exercise 4- Name range

1. Define a named range (**product_**) for associated cells in **products sheet**
2. Update lookup formula by using this named range, e.g. the D2 lookup formula could be “=VLOOKUP($A2,products_,3,FALSE)”
3. Does it help save efforts in manipulating table?

Google spreadsheet

CSV importing – GoogleDocs

1. Find the dataset '**uk_top_40.csv**' in **part2**
2. Download it and upload to Google Drive
3. Make sure you tick the setting in Google Drive



4. Freeze
5. Sorting
6. "Can you find the most recent album?"

Data Processing formula

Aggregation: (arg: can be literals or cell references)

=SUM (arg_1,arg_2,..., arg_10) e.g. =SUM(1, 2, 3) or =SUM(E2 : E5)

=AVERANGE (arg_1,arg2,...,arg10)

=MAX (arg_1, arg_2,…, arg10)

=MIN (arg_1, arg_2,…, arg10)

=COUNT (arg_1, arg_2,…, arg10) - COUNT(E1:E5)

=COUNTA (arg_1, arg_2,…, arg10) - COUNTA (E1:E5)

Conditional:

=IF(test, then, otherwise_then)

Conditional aggregation:

=COUNTIF(range, criteria)

=SUMIF(test_range, criteria, sum_range)

Unique, Filter and Sorting

=UNIQUE(Range_of_Array) e.g. =UNIQUE(A5:D15) ---Unique row

=FILTER(Range_of_Array, arrayCondition_1, arrayCondition_2, ..., arrayCondition_30) e.g. =FILTER(A5:D15, B5:B15 < 2000)

=SORT(data, keyColumn_1, ascOrDesc_1, keyColumn_2, ascOrDesc_2, ..., keyColumn_30, ascOrDesc_30) e.g. =SORT(A5:D15, B2:B15, True)

Processing formula

Array Formula: "=ARRAYFORMULA()"

Pass an array of arguments to functions/operators, which typically take non-array arguments:

Operator examples:

"<" – "=ARRAYFORMULA(A2:E15<5)"

"+" – "=ARRAYFORMULA(A2:A15+B2:B15)"

Function examples:

"LEN" – "ARRAYFORMULA(LEN(A2:E15))"

Exercise 5-comprehensive exercise

1. **Calculate the total album sales by QUEEN!**
2. **Which album has the shortest title? How short is the title?**
3. **Which album has the longest title? How long is the title?**
4. **Which band has the most number of albums? Is the answer more than one?**
5. **From all the bands with the most number of albums, which one has the lowest sales?**
6. **From all the bands with the most number of albums, which one has the highest sales?**
7. **List all the artists whose albums were released in the 70s! Calculate the average of their album sales!**
8. **List the top three albums in the 80s with the highest album sales! From those albums which one is the most recent one?**
9. **List the albums during 70s and 60s sorted by the year!**
10. **Which particular year appears most frequently in the UK Top 40 list?**

Data Importing

Usually for collaboration:

“File -> Share…”

See the link such as

https://docs.google.com/a/student.unimelb.edu.au/spreadsheets/d/**1e6CCgCHhe0ovhlObnWw4kR0q3prif5h7WAMFuAWPgK8**/edit?usp=sharing

“=ImportRange(key_of_spreadsheet, imported_range)”

key_of_spreadsheet – the key that you want to share with me

Import_range – the range of cells that I want to import in my file

Exercise 6-Data combining

You can import the data **Uk_top_40 extra** into the document that contains the original **UK_top_40:**

=importRange("tsEQscrEtxRPDYC2UJO6rOQ","Sheet1!A1:C35")

- Combine two sheets by using VLOOKUP (the public field “Artist”)
- Calculate the average album sales by UK artists
- In which decade, the US artists have sold the most number of albums?
- Which genre is the most popular one? Has the genre performed consistently in each decade?
- List top 3 countries that have sold the most albums
- Which country outside UK has its artists sold the most number of albums?

Phase 2 Assignment -data manipulation, visualisation and representation

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- There are two parts of work:
  - Specification
  - 1. Individual work – one student choose one question
  - 2. group work – A movie recommender system
  - Deadline - 29 April 2015 5pm