**Updating the Web via Excel Spreadsheet**

Reading directly off a spreadsheet can have performance issues due to the lack of query optimisation features provided by Excel. A solution to this could be to upload data onto a SQL database, which is to be accessed by the web application. It is possible to upload data directly from Excel using the VBA programming language.

A decision had to be made on when SQL queries are to be executed:

* On Edit
* Only modified ranges are accessed; better performance
* On Save
* Performance may deteriorate with larger data sets as there are more rows to iterate through
* Users tend to save once they are happy with their changes which may mean this approach could prevent unnecessary traffic to the database

Solution

* Record Change on Edit but Run Queries on Save
* Create a hidden sheet where all changes are to be recorded (including the type of query that is to be executed). This would mean that we are only looking through records that have been added/modified/deleted
* Performance in VBA is hampered significantly with the number of cells accessed. For example, if a record is updated twice before save, then the second update should not add a new row to the hidden sheet as this would mean that more cells are to be accessed on saving the document. This could be prevented by adding a pointer to every record that is changed.
* As mentioned before, one record should have a maximum of one reference in the hidden sheet. For example, if a record is modified twice before save, then the first update should be ignored. This would prevent unnecessary calls to the database.
* Pointers will be used in the hidden sheet to indicate the row number of the corresponding record in the input sheet; this will be generated by applying a formula e.g. =ROW() to ensure that pointers are updated should rows be deleted. The pointer will then be pulled into the data entry sheet using another formula.

|  |  |
| --- | --- |
| Status of Data on Input Sheet | Query |
| Uploaded |  |
| Uploaded, Modified Via Spreadsheet | UPDATE |
| Uploaded, Deleted Via Spreadsheet | DELETE |
| Uploaded, Modified Via Spreadsheet, Then Deleted Via Spreadsheet | DELETE |
| Added Via Spreadsheet | INSERT |
| Added Via Spreadsheet Then Modified | INSERT |
| Added Via Spreadsheet, Then Deleted |  |

Example of Data

* Data that has not been modified since upload will have no pointers

|  |  |  |  |
| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer (Hidden) |
| 2 | K1406809 | Sofya |  |

* If the data is modified, it will be added onto the hidden sheet and the row number will be assigned as a pointer on the data entry sheet.

|  |  |  |  |
| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer |
| 2 | K1406809 | Lisa | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hidden Sheet | | | | |
| Row | ID | Name | Query | Pointer |
| 2 | K1406809 | Lisa | UPDATE | 2 |

* If a new record is inserted, it will be added onto the hidden sheet and a pointer is added

|  |  |  |  |
| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer (Hidden) |
| 2 | K1406809 | Lisa | 2 |
| 3 | K1406302 | Sonya | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hidden Sheet | | | | |
| Row | ID | Name | Query | Pointer |
| 2 | K1406809 | Lisa | UPDATE | 2 |
| 3 | K1406302 | Sonya | INSERT | 3 |

* If data has been modified then deleted before saving it should change the query type in the hidden sheet of the corresponding record. The data that is on the database must be referenced as we cannot delete data that does not exist

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| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer (Hidden) |
| 2 | K1406302 | Sonya | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hidden Sheet | | | | |
| Row | ID | Name | Query | Pointer |
| 2 | K1406809 | Sofya | DELETE | 2 |
| 3 | K1406302 | Sonya | INSERT | 3 |

* On saving the document, we loop through the rows in the hidden sheet and execute the appropriate queries and clear the data from the sheet, before clearing all data within the hidden Pointer column in our data entry sheet.

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| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer (Hidden) |
| 2 | K1406302 | Sonya |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hidden Sheet | | | | |
| Row | ID | Name | Query | Pointer |

* If a new record is to be added onto the spreadsheet, then modified before saving, this would still be an INSERT query as the data does not exist on the database

|  |  |  |  |
| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer (Hidden) |
| 2 | K1406302 | Sonya |  |
| 3 | K0006302 | Tony | 2 |

|  |  |  |  |
| --- | --- | --- | --- |
| Hidden Sheet | | | |
| ID | Name | Query | Pointer |
| K0006302 | Tony | INSERT | 2 |

|  |  |  |  |
| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer (Hidden) |
| 2 | K1406302 | Sonya |  |
| 3 | K0006302 | Toni | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hidden Sheet | | | | |
| Row | ID | Name | Query | Pointer |
| 2 | K0006302 | Toni | INSERT | 2 |

* If a new record is to be added onto the spreadsheet, then deleted before saving, the corresponding row in the hidden sheet must be removed as no queries are to be executed

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| --- | --- | --- | --- |
| Data Entry Sheet | | | |
| Row | ID | Name | Pointer (Hidden) |
| 2 | K1406302 | Sonya |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hidden Sheet | | | | |
| Row | ID | Name | Query | Pointer |