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# **databuild Documentation**

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<b>1</b>	<b>Contents</b>	<b>3</b>
1.1	Installation . . . . .	3
1.2	Quickstart . . . . .	3
1.3	Philosophy . . . . .	4
1.4	Buildfiles . . . . .	4
1.5	Python API . . . . .	5
1.6	Operation Functions . . . . .	6
1.7	Custom Operation . . . . .	10
1.8	Expressions . . . . .	11
1.9	Environments . . . . .	11
1.10	Functions . . . . .	12
1.11	Settings . . . . .	13
<b>2</b>	<b>Indices and tables</b>	<b>15</b>



Databuild is an automation tool for data manipulation.

The general principles in Databuild are:

- Low entry barrier
- Easy to install
- Easy to grasp
- Extensible

Databuild can be useful for scenarios such as:

- Documenting data transformations in your infoviz project
- Automate data processing in a declarative way



## 1.1 Installation

Install Databuild:

```
$ pip install databuild
```

## 1.2 Quickstart

Run databuild using a [buildfile](#):

```
$ data-build.py buildfile.json
```

`buildfile.yaml` contains a list of operations to be performed on data. Think of it as a script for a spreadsheet.

An example of build file could be:

```
- operation: sheets.import_data
  description: Importing data from csv file
  params:
    sheet: dataset1
    format: csv
    filename: dataset1.csv
    skip_last_lines: 1
- operation: columns.add_column
  description: Calculate the gender ratio
  params:
    sheet: dataset1
    name: Gender Ratio
    expression:
      language: python
      content: "return float(row['Totale Maschi']) / float(row['Totale Femmine'])"
- operation: sheets.export_data
  description: save the data
  params:
    sheet: dataset1
    format: csv
    filename: dataset2.csv
```

JSON buildfiles are also supported. Databuild will guess the type based on the extension.

## 1.3 Philosophy

Databuild is an alternative to more complex and complete packages like pandas, numpy, and R.

It's aimed at users that are not necessarily data scientist and are looking to a simpler alternative to such softwares.

It's admittely less performant than those and is not optimized for huge datasets. But Databuild is much easier to get started with.

The general principles in Databuild are:

- Low entry barrier
- Easy to install
- Easy to grasp
- Extensible

Databuild can be useful for scenarios such as:

- Documenting data transformations in your infoviz project
- Automate data processing in a declarative way

## 1.4 Buildfiles

A buildfile contains a list of operations to be performed on data. Think of it as a script for a spreadsheet.

JSON and YAML format are supported. databuild will guess the format based on the file extension.

An example of build file could be:

```
[
  {
    "operation": "sheets.import_data",
    "description": "Importing data from csv file",
    "params": {
      "sheet": "dataset1",
      "format": "csv",
      "filename": "dataset1.csv",
      "skip_last_lines": 1
    }
  },
  {
    "operation": "columns.add_column",
    "description": "Calculate the gender ratio",
    "params": {
      "sheet": "dataset1",
      "name": "Gender Ratio",
      "expression": {
        "language": "python",
        "content": "return float(row['Male Total']) / float(row['Female Total'])"
      }
    }
  },
  {
    "operation": "sheets.export_data",
    "description": "save the data",
    "params": {
```



```

    "sheet": "dataset1",
    "format": "csv",
    "filename": "dataset2.csv"
  }
}
]

```

The same file in yaml:

```

- operation: sheets.import_data
  description: Importing data from csv file
  params:
    sheet: dataset1
    format: csv
    filename: dataset1.csv
    skip_last_lines: 1
- operation: columns.add_column
  description: Calculate the gender ratio
  params:
    sheet: dataset1
    name: Gender Ratio
    expression:
      language: python
      content: "return float(row['Male Total']) / float(row['Female Totale'])"
- operation: sheets.export_data
  description: save the data
  params:
    sheet: dataset1
    format: csv
    filename: dataset2.csv

```

You can split a buildfile in different files, and have databuild process the directory that contains them.

Build files will be executed in alphabetical order. It's recommended that you name them starting with a number indicating their order of execution. For example:

```

-- buildfiles
-- 1_import.yaml
-- 2_add_column.yaml
-- 3_export.yaml
-- data
-- dataset1.csv

```

## 1.5 Python API

Databuild can be integrated in your python project. Just import the build function:

```

from databuild.builder import Builder

Builder().build('buildfile.json')

```

### Supported arguments:

- **build\_file** Required. Path to the buildfile.
- **settings** Optional. Python module path containing the settings. Defaults to `datbuild.settings`
- **echo** Optional. Set this to `True` if you want the operations' description printed to the screen. Defaults to `False`.

## 1.6 Operation Functions

Operations functions are regular Python function that perform actions on the book. Examples of operations are: `sheets.import_data`, `columns.add_column`, `columns.update_column`, and more.

They have a function name that identifies them, an optional description and a number of parameters that they accept. Different operation functions accept different parameters.

**All operations accepts the following arguments:**

- `name`: The name idnetifying the operation function
- `description`: Optional. A description to print on screen when the operation gets executed
- `params`: Parameter for the operation. This varies by operation. See below for a detailed list.
- `context`: Optional. An additional set of properties that can be made available to the operation. This can be used in expression or interpolated in strings (by using the `{{ my var }}` syntax).
- `enabled`: Optional. Set this to `False` to skip execution of the operation. Useful for debug. Defaults to `True`.

### 1.6.1 Available Operation Functions

#### `sheets.import_data`

Creates a new sheet importing data from an external source.

**params:**

- `filename`: Required.
- `sheet`: Optional. Defaults to `filename`'s `basename`.
- `format`: Values currently supported are `'csv'` and `'json'`.
- `headers`: Optional. Defaults to `null`, meaning that the importer tries to autodetects the header names.
- `encoding`: Optional. Defaults to `'utf-8'`.
- `skip_first_lines`: Optional. Defaults to 0. Supported only by the CSV importer.
- `skip_Last_lines`: Optional. Defaults to 0. Supported only by the CSV importer.
- `guess_types`: Optional. If set to `true`, the CSV importer will try to guess the data type. Defaults to `true`.
- `replace`: Optional. if set to `true` and the sheet already exists, its content will be replaced. if set to `false`, the new data will be appended. Defaults to `false`.

#### `sheets.add`

**params:**

- `name`
- `headers` (optional)

Adds a new empty sheet named `name`. Optionally sets its headers as specified in `headers`.

**sheets.copy****params:**

- source
- destination
- headers (optional)

Create a copy of the `source` sheet named `destination`. Optionally copies only the headers specified in `headers`.

**sheets.export\_data****params:**

- sheet
- format
- filename
- headers (optional)

Exports the datasheet named `sheet` to the file named `filename` in the specified `format`. Optionally exports only the headers specified in `headers`.

**sheets.print\_data****params:**

- sheet

**columns.update\_column****params:**

- sheet
- column
- facets (optional)
- values
- expression

Either `values` or `expression` are required.

**columns.add\_column****params:**

- sheet
- name
- values
- expression

Either `values` or `expression` are required.

#### `columns.remove_column`

**params:**

- `sheet`
- `name`

#### `columns.rename_column`

**params:**

- `sheet`
- `old_name`
- `new_name`

#### `columns.to_float`

**params:**

- `sheet`
- `column`
- `facets` (optional)

#### `columns.to_integer`

**params:**

- `sheet`
- `column`
- `facets` (optional)

#### `columns.to_decimal`

**params:**

- `sheet`
- `column`
- `facets` (optional)

#### `columns.to_text`

**params:**

- `sheet`
- `column`

- `facets` (optional)

#### `columns.to_datetime`

##### **params:**

- `sheet`
- `column`
- `facets` (optional)

#### `system.call_command`

Calls an external command with the provided arguments.

##### **params:**

- `command`
- `arguments`

#### `system.remove_dir`

Deletes a directory and all of its content.

##### **params:**

- `path`: The path of the directory. Either absolute or relative to the build file.

#### `system.make_dir`

Creates a directory recursively.

##### **params:**

- `path`: The path of the directory. Either absolute or relative to the build file.

#### `operations.define_operation`

Define an alias to an operation with default params that can be reused.

##### **params:**

- `name`: how you want to name your operation. This is name that you will use to call the operation later.
- `operation`: the original path of the operation
- `defaults`: values that will be used as defaults for the operation. You can override them by using the `params` property when you call your operation

### `operations.define_task`

Define an a task, a list of operations with default params that can be reused.

#### params:

- name: How you want to name your task. This is name that you will use to call the task later.
- operations: The operations to be applied
- description: Optional. A description to be printed when calling the task.
- defaults: Optional. values that will be used as defaults for the operations. You can override them by using the `overrides` param when you call your task

### `operations.call_task`

Call a previously defined task

#### params:

- name: the name your task. This is name that you will use to call the operation later.
- operations: the operations to be applied
- description: Optional. A description to be printed when calling the task.
- overrides: values that will override the defaults for the operations.

## 1.7 Custom Operation

You can add your custom operation and use them in your buildfile.

An Operation is just a regular python function. The first arguments has to be the `context`, but the remaining arguments will be pulled in from the `params` property of the operation in the buildfile.

By default, `context` is a `dict` with following keys:

- `workbook`: a reference the workbook object
- `buildfile`: a reference to the build file the operation has been read from.

```
def myoperation(context, foo, bar, baz):  
    pass
```

Operations are defined in modules, which are just regular Python files.

As long as your operation modules are in your `PYTHONPATH`, you can add them to your `OPERATION_MODULES` setting (see [operation-modules-setting](#)) and then call the operation in your buildfile by referencing its import path:

```
[  
    ...,  
    {  
        "operation": "mymodule.myoperation",  
        "description": "",  
        "params": {  
            "foo": "foos",  
            "bar": "bars",  
            "baz": "bazes"  
        }  
    }  
]
```

```
}
]
```

## 1.8 Expressions

Expressions are objects encapsulating code for situations such as filtering or calculations.

An expression has the following properties:

- `language`: The name of the environment where the expression will be executed, as specified in `settings.LANGUAGES`. See [LANGUAGES](#)).
- `content`: The actual code to run, or
- `path`: path to a file containing the code to run

The expression will be evaluated inside a function and run against every row in the datasheet. The following context variables will be available:

```
* ``row``: A dictionary representing the currently selected row.
```

## 1.9 Environments

[Expressions](#) are evaluated in the environment specified by their `language` property.

The value maps to a specific environment as specified in `settings.LANGUAGES` (See the [LANGUAGES](#) setting).

### 1.9.1 Included Environments

Currently, the following environments are shipped with databuild:

#### Python

**Unsafe** Python environment. Use only with trusted build files.

### 1.9.2 Writing Custom Environments

An `Environment` is a subclass of `databuild.environments.base.BaseEnvironment` that implements the following methods:

- `__init__(self, book)`: Initializes the environment with the appropriate global variables.
- `copy(self, iterable)`: Copies a variable from the databuild process to the hosted environment.
- `eval(self, expression, context)`: Evaluates the string *expression* to an actual functions and returns it.

## 1.9.3 Add-on Environments

### Lua

An additional Lua environment is available at <http://github.com/databuild/databuild-lua>

Requires Lua or LuaJIT (Note: LuaJIT is currently unsupported on OS X).

## 1.10 Functions

Functions are additional methods that can be used inside [Expressions](#).

### 1.10.1 Available Functions

#### cross

Returns a single value from a column in a different sheet.

##### arguments:

- `row` reference to the current row
- `sheet_source` name of the sheet that you want to get the data from
- `column_source` name of the column that you want to get the data from
- `column_key` name of the sheet that you want to match the data between the sheets.

#### column

Returns an array of values from column from a different dataset, ordered as the key.

##### arguments:

- `sheet_name` name of the current sheet
- `sheet_source` name of the sheet that you want to get the data from
- `column_source` name of the column that you want to get the data from
- `column_key` name of the sheet that you want to match the data between the sheets.

### 1.10.2 Custom Functions Modules

You can write your own custom functions modules.

A function module is a regular Python module containing Python functions with the following signature:

```
def myfunction(environment, book, **kwargs)
```

Function must accept the `environment` and `book` positional arguments. After them, everything other argument is up to the function.

Another requirement is that the function must return a value wrapped into the environment's copy method:

```
return environment.copy(my_return_value)
```



Function modules must be made available by adding them to the `FUNCTION_MODULES` [Settings](#) variable.

## 1.11 Settings

### 1.11.1 ADAPTER

Classpath of the adapter class. Defaults to `'databuild.adapters.locmem.models.LocMemBook'`.

### 1.11.2 LANGUAGES

A dict mapping languages to [Environments](#). Default to:

```
LANGUAGES = {
    'python': 'databuild.environments.python.PythonEnvironment',
}
```

### 1.11.3 FUNCTION\_MODULES

A tuple of module paths to import [Functions](#) from. Defaults to:

```
FUNCTION_MODULES = (
    'databuild.functions.data',
)
```

### 1.11.4 OPERATION\_MODULES

A tuple of module paths to import [Operation Functions](#) from. Defaults to:

```
OPERATION_MODULES = (
    "databuild.operations.sheets",
    "databuild.operations.columns",
    "databuild.operations.operations",
)
```



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## Indices and tables

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- `genindex`
- `modindex`
- `search`