

# Data-Forge cheat sheet

Run this notebook with [Data-Forge Notebook](#)

Snippets of JS code that show how to work with data using [Data-Forge](#).

From the book [Data Wrangling with JavaScript](#)

For more in-depth help please see the [The Guide](#) or [the API docs](#).

## Loading data into a dataframe

Load data from memory into a Data-Forge [DataFrame](#).

```
let data = [{ A: 1, B: 10 }, { A: 2, B: 20 }, { A: 3, B: 30 }];
let df = new dataForge.DataFrame(data);
display(df);
```

| __index__ | A | B  |
|-----------|---|----|
| 0         | 1 | 10 |
| 1         | 2 | 20 |
| 2         | 3 | 30 |

## Loading CSV files

Load data from a CSV file using [readFile](#) and [parseCSV](#).

```
let df = await dataForge
  .readFile("./example.csv", { dynamicTyping: true })
  .parseCSV();
display(df.head(5)); // Preview first 5 rows.
```

| __index__ | Name | Sex | Age | Height (in) | Weight (lbs) |
|-----------|------|-----|-----|-------------|--------------|
| 0         | Alex | M   | 41  | 74          | 170          |
| 1         | Bert | M   | 42  | 68          | 166          |
| 2         | Carl | M   | 32  | 70          | 155          |
| 3         | Dave | M   | 39  | 72          | 167          |
| 4         | Elly | F   | 30  | 66          | 124          |

## Loading JSON files

Load data from JSON files using [readFile](#) and [parseJSON](#).

```
let df = await dataForge
  .readFile("./example.json")
  .parseJSON();
display(df.tail(5)); // Preview last 5 rows.
```

| __index__ | Name | Sex | Age | Height (in) | Weight (lbs) |
|-----------|------|-----|-----|-------------|--------------|
| 13        | Neil | M   | 36  | 75          | 160          |
| 14        | Omar | M   | 38  | 70          | 145          |
| 15        | Page | F   | 31  | 67          | 135          |
| 16        | Quin | M   | 29  | 71          | 176          |
| 17        | Ruth | F   | 28  | 65          | 131          |

# Data transformation

Transform or rewrite your data set using the [select](#) function (similar to JavaScript's `map` function):

Example: Transforming the value of the Height column from inches to centimetres.

```
let df = await dataForge
  .readFile("./example.csv", { dynamicTyping: true })
  .parseCSV();

let transformed = df.select(row => { // Transform the dataframe, convert
  const clone = Object.assign({}, row); // Clone the original so that we don't
  clone["Height (cm)"] = clone["Height (in)"] * 2.54; // Convert from inches to centimetres
  return clone;
});

display(transformed.head(5));
```

| __index__ | Name | Sex | Age | Height (in) | Weight (lbs) | Height (cm)        |
|-----------|------|-----|-----|-------------|--------------|--------------------|
| 0         | Alex | M   | 41  | 74          | 170          | 187.96             |
| 1         | Bert | M   | 42  | 68          | 166          | 172.72             |
| 2         | Carl | M   | 32  | 70          | 155          | 177.8              |
| 3         | Dave | M   | 39  | 72          | 167          | 182.88             |
| 4         | Elly | F   | 30  | 66          | 124          | 167.64000000000001 |

# Data filtering

Filter data with the the [where](#) function (similar to JavaScript's `filter` function).

Example: Filtering for tall people.

```
let df = await dataForge
  .readFile("./example.json")
  .parseJSON();

let filtered = df.where(row => row["Height (in)"] >= 70); // Filter for very tall people.

display(filtered);
```

| __index__ | Name | Sex | Age | Height (in) | Weight (lbs) |
|-----------|------|-----|-----|-------------|--------------|
| 0         | Alex | M   | 41  | 74          | 170          |
| 2         | Carl | M   | 32  | 70          | 155          |
| 3         | Dave | M   | 39  | 72          | 167          |
| 7         | Hank | M   | 30  | 71          | 158          |
| 8         | Ivan | M   | 53  | 72          | 175          |
| 11        | Luke | M   | 34  | 72          | 163          |
| 13        | Neil | M   | 36  | 75          | 160          |
| 14        | Omar | M   | 38  | 70          | 145          |
| 16        | Quin | M   | 29  | 71          | 176          |

# Working with series (columns)

## Removing one or more series

Example: Removing the Height and Weight columns using the [dropSeries](#) function.

```
let df = await dataForge.readFile("./example.json").parseJSON();

let modified = df.dropSeries(["Height (in)", "Weight (lbs)"]);

display(modified.head(3));
```

| __index__ | Name | Sex | Age |
|-----------|------|-----|-----|
| 0         | Alex | M   | 41  |
| 1         | Bert | M   | 42  |
| 2         | Carl | M   | 32  |

## Renaming one or more series

Example: Renaming the Height and Weight columns using the [renameSeries](#) function so that the field names don't specify the unit of measurement.

```
let df = await dataForge.readFile("./example.json").parseJSON();

let modified = df.renameSeries({
  "Height (in)": "Height",
  "Weight (lbs)": "Weight",
});

display(modified.head(3));
```

| __index__ | Name | Sex | Age | Height | Weight |
|-----------|------|-----|-----|--------|--------|
| 0         | Alex | M   | 41  | 74     | 170    |
| 1         | Bert | M   | 42  | 68     | 166    |
| 2         | Carl | M   | 32  | 70     | 155    |

## Extracting, transforming and merging a series

Example: converting the Height column from inches to centimeters.

```
let df = await dataForge.readFile("./example.json").parseJSON();
df = df.renameSeries({ "Height (in)": "Height" }) // Rename series.
      .setIndex("Name");                          // We need an index in order to merge data.

let heights = df.getSeries("Height");

// You can also do this:
// let heights = df.deflate(row => row.Height);

heights = heights.select(value => value * 2.54); // Convert from inches to centimeters.

df = df.withSeries("Height", heights); // Merge the modified series into the source data set.

display(df.head(3));
```

| __index__ | Name | Sex | Age | Height | Weight (lbs) |
|-----------|------|-----|-----|--------|--------------|
| Alex      | Alex | M   | 41  | 187.96 | 170          |
| Bert      | Bert | M   | 42  | 172.72 | 166          |
| Carl      | Carl | M   | 32  | 177.8  | 155          |

## A simpler way to transform a series

Example: Using the DataFrame [transformSeries](#) function makes the previous example a bit simpler.

```
let df = await dataForge.readFile("./example.json").parseJSON();
df = df.renameSeries({ "Height (in)": "Height" }); // Rename series.
```

```
df = df.transformSeries({ Height: value => value * 2.54 }); // Convert Height from inches to centimeters
display(df.head(3));
```

| __index__ | Name | Sex | Age | Height | Weight (lbs) |
|-----------|------|-----|-----|--------|--------------|
| 0         | Alex | M   | 41  | 187.96 | 170          |
| 1         | Bert | M   | 42  | 172.72 | 166          |
| 2         | Carl | M   | 32  | 177.8  | 155          |

## Group and summarize

We can use the [groupBy](#) function to group our data set and then boil each group down to a summary.

Example: Getting the average height and weight for male and female groups.

```
let df = await dataForge.readFile("./example.json").parseJSON();

df = df.renameSeries({
  "Height (in)": "Height",
  "Weight (lbs)": "Weight",
});

let summary = df.groupBy(row => row.Sex) // Sort the data set into groups. This returns a series.
  .select(group => { // Transform each group into a summary.
    return {
      Sex: group.first().Sex,
      Count: group.count(),
      Height: group.deflate(row => row.Height).average(),
      Weight: group.deflate(row => row.Weight).average(),
    };
  })
  .inflate(); // Inflate the series to a dataframe (groupBy returns a series);

display(summary);
```

| __index__ | Sex | Count | Height            | Weight             |
|-----------|-----|-------|-------------------|--------------------|
| 0         | M   | 11    | 71.27272727272727 | 161.63636363636363 |
| 1         | F   | 7     | 65.57142857142857 | 123.28571428571429 |

## Aggregation

We can use the [aggregate](#) function (like the JavaScript `reduce` function) to boil our entire data set down to a simple summary.

Example: Get the average height and weight for the entire group.

```
let df = await dataForge.readFile("./example.json").parseJSON();

df = df.renameSeries({
  "Height (in)": "Height",
  "Weight (lbs)": "Weight",
});

let summary = df.aggregate((agg, row) => ({
  Height: (agg.Height + row.Height) / 2,
  Weight: (agg.Weight + row.Weight) / 2,
}));

display(summary);
```

```
{
  "root": { 2 items
    "Height": 67.41633605957031
    "Weight": 144.37367248535156
  }
}
```

## Save CSV files

Save your modified data to a CSV file using functions [asCSV](#) and [writeFile](#).

```
let df = await dataForge
  .readFile("./example.csv", { dynamicTyping: true })
  .parseCSV();

let transformed = df.select(row => { // Transform data.
  const clone = Object.assign({}, row);
  clone["Height (cm)"] = clone["Height (in)"] * 2.54;
  return clone;
});

await df.asCSV().writeFile("./transformed.csv"); // Save CSV file.
```

## Save JSON files

Save your modified data to a JSON file using function [asJSON](#) and [writeFile](#).

```
let df = await dataForge
  .readFile("./example.json")
  .parseJSON();

let transformed = df.select(row => { // Transform data.
  const clone = Object.assign({}, row);
  clone["Height (cm)"] = clone["Height (in)"] * 2.54;
  return clone;
});

await df.asJSON().writeFile("./transformed.json"); // Save JSON file.
```

## Getting data from a REST API

Use the [axios module](#) to retrieve data from a REST API (with data from [JSONPlaceholder](#)).

```
const axios = require('axios');
const response = await axios("https://jsonplaceholder.typicode.com/todos");
const data = new dataForge.DataFrame(response.data);
display(data.head(5));
```

| __index__ | userId | id | title   | completed |
|-----------|--------|----|---|-----------|
| 0         | 1      | 1  | delectus aut autem  | false     |
| 1         | 1      | 2  | quis ut nam facilis et officia qui                              | false     |
| 2         | 1      | 3  | fugiat veniam minus   | false     |
| 3         | 1      | 4  | et porro tempora  | true      |
| 4         | 1      | 5  | laboriosam mollitia et enim quasi adipisci quia provident illum | false     |