**STANDARD FOR .json INPUT FILE GEA PROJECT**

We define in this document the standard for building the .json file which will be the input of the optimization model. There shall be 3 arrays of objects, named **‘Equipment’**, **‘WorkFlows’**, **‘Products’**, **‘Demand’** and **‘CIPs’**

**EQUIPMENT:**

To define the equipment array, we must specify every equipment item (if there are 2 pasteurizers, they must be defined separately) as an object with the following attributes:

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Description** | **Type of variable** |
| **name** | Name of the equipment. | String |
| **id** | Unique id of the equipment | String |
| **input** | Number of input transfer lines. | Integer |
| **output** | Number of output transfer lines. | Integer |
| **volume** | Volume in liters. | Integer |
| **volume\_to\_empty** | Minimum volume to start emptying in liters. | Integer |

\*\*\* CLEANING INFORMATION MUST BE ADDED TO THE EQUIPMENT ATTRIBUTES; HOWEVER, NOT ENOUGH IS KNOWN ABOUT CLEANING PROCEDURE AS OF NOW.

**WORKFLOWS:**

We also must define the available workflows between equipment:

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Description** | **Type of variable** |
| **name** | Workflow name. | String |
| **nodes** | Nodes of the workflow graph. Each node is a dictionary specifying the type of duration (either fixed or variable) and its duration. | Dictionary of dictionary. Each dictionary has syntax:   * name[string] * id[string] * Subprocess[string] * duration\_type[string (“variable” or “fixed”)] * duration[int] |
| **edges** | Edges of the workflow graph. Each edge is a dictionary specifying connection dependency, delay, input and output products, if flow is to be considered and flowrate. | List of dictionary. Each dictionary has syntax:   * name\_origin[string] * id\_origin[string] * subprocess\_origin[string] * name\_destination[string] * id\_destination[string] * subprocess\_destination[string] * connection[string (“FS” or “SS”)] * delay[int] * product\_origin[string] * product\_id\_origin[int] * product\_destination[string] * product\_id\_destination[int] * flow[boolean] * flowrate[int] |

**PRODUCTS:**

To define the product array, we must specify every product as an object with the following attributes:

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Description** | **Type of variable** |
| **name** | Product name. | String |
| **id** | Product id. | Integer |
| **compatibility\_list** | List of dictionaries specifying cleaning duration of the defined product change. | List of dictionary. Each dictionary has syntax:   * name[string] * id[int] * cleaning duration[string (“no”, “short” or “long”)] |

**DEMAND:**

Definition of the demand required for the planning.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Description** | **Type of variable** |
| **product\_name** | Product name. | String |
| **product\_id** | Product id. | Integer |
| **date** | Due date. | String (Date) |
| **amount** | Amount that must be satisfied by the due date | Integer |

**CIPs:**

Definition of the CIP stations and associated CIP lines:

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Description** | **Type of variable** |
| **station\_name** | Station name. | String |
| **station\_id** | Station id. | String |
| **lines** | Dictionary specifying each line and its connected equipment list. | Dictionary:   * name[string] * equipment\_list[list of dictionary] |

**CHECK THE example.json FILE TO SEE AN EXAMPLE.**

**STANDARD FOR .json OUTPUT FILE GEA PROJECT**

The algorithm’s output will be presented in a .json file with the following structure. The file will contain a list of dictionaries with the following attributes.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Description** | **Type of variable** |
| **name** | Name of the equipment. | String |
| **id** | Equipment unique id. | String |
| **percentage\_utilization** | Percentage of utilization of this particular equipment. | Float |
| **bottleneck\_order** | Position in order of percentage of utilization with respect to the rest of equipment | Integer |
| **timetable** | The timetable for the equipment. List of dictionaries. | List of dictionary. Each dictionary has syntax:   * subprocess[string] * start[int] * end[int] |

**CHECK THE output.json FILE TO SEE AN EXAMPLE.**