2020 INFORMS Demo Formulation

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## 1 Data

### 1.1 Sets

* Let be the set of tasks that need to be completed.
* Let be the set of resource groups.
* Let be the set of resources that can complete the tasks.
* Let be the set of tasks that resource can perform.
* Let be the set of resources that a task can be assigned to.
* Let be the set of resources that belong to resource group .

### 1.2 Data Inputs

* Let be the number of hours for a task .
* Let be the cost per hour for a resource .
* Let be the number of hours that a resource can work in one day.
* Let be the minimum number of tasks, , that a resource group can work in one day.
* Let be the maximum number of tasks, , that a resource group can work in one day.

### 1.3 Data Transformations

* Let be the cost for a resource performing a task .

## 2 Decision Variables

* Let be one if the resource is assigned to perform task , 0 otherwise.
* Let be the number of tasks assigned to resources in .

## 3 Constraints

### 3.1 Assign Each Task to only One Resource

Each task can only be assigned to be performed one task in the model.

### 3.2 Ensure Each Resource Stays within their Allowed Hours

Each resource can only be assigned tasks whose total time must be no more than their maximum hours for a day.

### 3.3 Count Tasks Assigned to Resource Group

Determine the number of tasks assigned to resources in each resource group

### 3.4 Resource Groupss are Task Count Limited

#### 3.4.1 Ensure Resource Group Meets Minimum Task Processing

Ensure each resource group is only scheduled up to its maximum number of tasks

#### 3.4.2 Ensure Resource Group Meets Maximum Task Processing

Ensure each resource group is only scheduled up to its maximum number of tasks

## 4 Objective

The objective function for the model is to minimize the cost of assigning the resources to tasks.