# Introduction

At Nagarro we pride ourselves on designing intelligent, state-of-the art solutions to real world problems. Now, one of the problems of our internal operations is resourcing. Each day we struggle to match available resources to project openings in an optimal way. There are several considerations: individual skills and expertise, project needs, project criticality, HR-related rules, and costs, to name a few.

Since we want to get less subjective and more efficient at resourcing, we are looking to create a solver for this matching.

# Problem statement

We have simplified the problem for this coding challenge. We have an available pool of resources, which must be matched to the requirements emanating from various projects.

You can assume that the available pool has already been carefully defined. The people who can be freed from existing projects are already marked as available. We also assume that HR-related rules (such as mandatory rotation of people) are already applied upstream to arrive at the available pool of resources.

The solver should be able to take in the given data for the set of resources and the openings and as an output provide a recommended allocation plan.

The structure of the input data is as follows:

## Openings

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Detail** | **Possible values** | **Data type** |
| RequestID | Unique identifier for an opening |  | Number |
| ClientKey | Client code |  | Text |
| ProjectKey | Project code |  | Text |
| CustomerName | Customer name |  | Text |
| ProjectName | Project name |  | Text |
| IsKeyProject | A project may be a key project for an account based on various factors such as the criticality for the customer, if there has been an escalation in the project, etc. | Y/N | Text |
| ProjectDomain | Domain that is relevant for the project. May be left blank for some openings |  | Text |
| ProjectStartDate | Start date of the project |  | Date |
| ProjectEndDate | End date of the project |  | Date |
| Role | Role in the project for which this opening has been defined | PCEO/Scrummaster/Architect/Quality Manager/Technical Lead/Quality Lead/Sr. Developer/Developer/Sr. Tester/Tester | Text |
| IsKeyPosition | A position may be defined as key or non-key based on the relative importance within the project context | Y/N | Text |
| YearsOfExperience | Desired years of total experience of the resource |  | Number |
| MandatorySkills | List of comma-separated keywords of skills and the required expertise level that are a must-have for this opening | e.g. Sharepoint-Beginner, Java-Expert, .NET-Intermediate | Text |
| OptionalSkills | Skills that are good-to-have for the candidate | e.g. Sharepoint, Java, .NET | Text |
| DomainExperience | Domain experience needed for the candidate to qualify for the opening | e.g. Airline, Publishing, Manufacturing | Text |
| ClientCommunication | This field specifies if extensive customer communication is involved in this role. This translates to the requirement of good communication skills for the candidate | Y/N | Text |
| CertificationRequirement | Any certifications that may be desired for qualifying. |  | Text |
| RequestStartDate | Request start date is the start date of the billing for this position. If this date is crossed without an allocation, billing loss occurs |  | Date |
| AllocationStartDate | This date will be filled when the resource is assigned to this opening |  | Date |
| AllocationEndDate | This date will denote the end of allocation of the resource to this opening |  | Date |
| BillingRate | Hourly billing rate for the project |  | Number |
| BillingAllocation | Percentage allocation required for this opening |  | Number |

## Resources

As part of this challenge, we will be releasing the input data in terms of the available resource pool and the current project openings.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Details** | **Possible values** | **Data type** |
| Sno | Serial number |  | Number |
| EmployeeID |  |  | Text |
| EmployeeName | Employee name |  | Text |
| DOJ | Date of joining Nagarro for the person |  | Date |
| Skills | List of keywords of skills that a person possesses along with the expertise level for that skill | e.g. Sharepoint-Expert, Java-Beginner, .NET-Intermediate | Text |
| DomainExperience | List of domains that the person has worked on | e.g. Airline, Publishing, Manufacturing | Text |
| Rating | Performance rating of the person | A+/A/B+/B | Text |
| CommunicationsRating | Rating of the person's communication skills | A+/A/B+/B | Text |
| NAGP | This field specifies if the person is an NAGP | Y/N | Text |
| Certifications | List of certifications that the person has |  | Text |
| YearsOfExperience | Total years of experience |  | Number |
| Current Role | The role that the person is currently playing | PCEO/Scrummaster/Architect/Quality Manager/Technical Lead/Quality Lead/Sr. Developer/Developer/Sr. Tester/Tester | Text |
| PreviousCustomerExperience | List of customer accounts that the person has previously worked for |  | Text |
| Costperhour | Per hour internal cost of the resource |  | Number |
| AvailableFromDate | Date from which the resource may be available for assignment |  | Date |

## Input data

We will be releasing sample input data at 12 Noon IST on Tuesday, the 14th of June, 2016.

## Evaluation criteria

The evaluation of the solution will be totally quantitative. It will be based on the quality of the solution obtained after running the solver for a maximum of 60 seconds on a special batch of test data (i.e. different from the sample data provided).

The quality of the solution calculation will understandably reflect the number of successful matches, the quality of the proposed matches and the overall project resourcing health. The following describes the exact calculation for the quality score of the solution:

1. For each qualified match proposed in the system, 1 point will be awarded as a starting value. The qualifying criteria for a match is matching of the resource skills to the required mandatory skills in the opening and the availability of this resource as per the requirements in the opening.
2. The actual quality of the match will be reflected in the following additions and subtractions from the value assigned to the match:
   1. NAGP – add 0.3 points if a resource marked NAGP is assigned to an opening
   2. Performance rating – add 0.2 points for an A+ or 0.1 points for an A
   3. Domain experience – add 0.2 points for experience in the same domain, add 0.3 points for experience with same customer account
   4. Years of experience – for every additional year of experience that the matched resource has over the number of years of experience mentioned in the opening, subtract 0.05 points
3. Notwithstanding the logic given above, the maximum allowable points awarded to a match will depend on the project type and position type as follows:

|  |  |  |
| --- | --- | --- |
|  | **Key position** | **Non-key position** |
| **Key project** | 2 | 1.3 |
| **Non-key project** | 1.5 | 1 |

1. In order to make sure that no one project gets all “maximum capability” resources, the overall average matching score for each project cannot exceed 1.5 points. For example, for a project with 6 openings, the highest possible score will be 12 points. However, the maximum allowable average score of a single project is 1.5 points. Therefore, the total allowable score for the 6 openings in this case would be 9 points.
2. The score for the solution is the summation of the scores for all matches in all projects, calculated as defined above.

# Event details

## Date

The input data will be provided at 12 Noon IST on Tuesday, the 14th of June and the solutions will be accepted till 12 Noon IST on Monday, the 4th of July.

Details on how the solution needs to be shared will be provided to all the registered participants.

Registration

Please use the following link to register for the event. Registration is open till 12 Noon IST, 15th of June 2016. In case of a tie in final scores, the individual/team which has registered earlier will be declared winner. Also Nagarro at its discretion can use any solution or combination of solutions for its purposes.

## Details on Q&A round

If you have any queries around the requirements or process then you can mail all your questions to [university@nagarro.com](mailto:university@nagarro.com) by 12 Noon IST on Thursday, the 16th of June 2016. Based on the questions received we will share responses in documented and/or webinar format in the week of 20-24 June 2016.

## Prizes

Euro 5,000 to the individual or team that wins the prize. There is no restriction on team size.