

A CASHIER ASSIGNMENT SYSTEM

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ABSTRACT: This paper is a description of the system developed by GRUPO APEX for EL CORTE INGLES implementing the process of personal assignment in the cash department. This System is currently running in a pilot site with a good performance.

1.- INTRODUCTION.

The Corte Inglés is one of the european largest great stores distribution network, with numerous sites all around Spain. They run a wide range of business. One of them is Hiper-Market. This is the area for wich GRUPO APEX has developed the system purpose of this paper.

Personal management in this kind of enterprises, and more precisely the cash department, counts with some peculiarities that make it different from the standard personal schedulling problem.

The personal necessities, (number of posts to cover) is stimated from the total amount of sales spected for each day. More over, within a single day, sales aren't the same all over

it and so, the number of posts that must be covered has to change in the same way. To be able to assume all those fluctuations in the necessities, cash department staff have contracts that involve a great flexibility both in timetable and allowance.

In the other hand, service must be satisfied in a correct way in order to insure enough quality. This constraint oblige to assign the adequate person depending of their skill to each job, to avoid changing the job a person do too many times in the same day or to make him cover it for a very short. All these things looking forward to maximize the level of completion of necessities and minimizing the number of people needed to do so.

All this involves the resolution of a very complex problem that currently takes over two man weeks every month for the personal department.

To give a better solution, GRUPO APEX has developed, upon ILOG-SOLVER, a system intended to automatize the assignment process between staff and jobs that is described bellow.

2. System Parameters.

In order to give a general purpose to the developed solution, that can be easilly adapted to differents sites, two kind of parameters have been considered.

Configuration: Including all those characteristics of the site that are common to every assignment process.

Assignment: Covering the particularization of all the configuration parameters for the assignment process in a particular time period.

2.1 Configuration Parameters.

The Parameters that can be defined are the following:

Kind of day:

This parameter cover the different kind of days to be consider during the assignment. It is reasonable thinking that similar days will have similar necessities and the person allowance will also be similar. So that it only will have to be defined once.

Request Period:

Request periods are all those times in every day on wich necessities can change for any job. The number and duration of those periods have no limits.

Contracts:

The type of contract is a fundamental parameter as it determines the allowance of persons. Each employee has a type of contract. The type of contract determine:

. wich kind of days that person can be used, the turns that he can make.

. the maximum and minimum number both of days and hours that can be used in a mounth.

. the shortest time he can be assigned to a single job

. the maximum number of times the person can change from a job to other in a very same day.

. the minimun percent of times in a day a person must be working to be used in the assigment.

. The category of temporal or staff of the person. This last parameter is very important as people from staff are used even they aren't needed and temporal people are only used those days when they are nedded.

Shifts:

Shifts are the differents hours that people can do. A shift can be divided in two or more sections.

Kind of Job:

The Kind of Job can be identified with the different departments that must be covered.

Every kind of Job is defined with his importance and the skill required to cover it.

For every Kind of Job and for every request period and kind of day, the number of posts to assign (necessities) must be stated.

People:

People are all the employees, both staff and temporal, that can be used in the assignment process. Each person is identified by his kind of contract and the skills he owns that allow him to cover the different kind of jobs.

2.1 Assignment Parameters.

The Assignment Parameters allows to fix the necessities and personal allowances to a particular day. All the parameters are inicialiced attending the configuration parameters, but can be freely modified by the user in order to fix a specific situation.

The parameters that must be defined are the following:

Calendar:

The Calendar in the temporal window for wich the assignment process is going to be run. Every day in the calendar must be identified by the kind of day it belongs and if wether the turn rotation must be done in that day or not.

Necessities/day:

Necessities are the number of post from each kind of job that must be cover in every Request Period. Initially they are fixed attending the kind of day defined, but can be changed for a particular day.

People/day:

In the same way that necessities, People characteristics can be changed freely for a single day.

3. The Assignment and Consolidation Process.

The Assignment Process, taking account of the Assignment Parameters, determine whether an employee must work or not, the turn he must do, and the jobs he must cover all around the day.

Although, the assignation process is run day by day the result of the previous days is used.

The assignment process has a simulation character. For a very same date different assignments can be made with different assignment parameters.

When the user decides to make an assignment definitive, he can consolidate it. In consolidation, each day has a unique assignment, and the result of it is used as constraints in other assignments to be made for the same day.

4. IMPLEMENTATION

For the implementation of the system, ILOG-SOLVER library has been used.

The great amount of constrained variables used and the large domains of them have made us convince the use of constraints with the implementation of a complex choose-variable and choose-value function leading the looking for process.

4.1. Constraints

The following constraints are taking into account.

- . If somebody is not available, his shift must be "NOT-AVAILABLE".
- . Outside the shift assigneg, nobody can cover any job.
- . One job only can be covered by one employee for the same period.
- . One employee can not cover one job for wich he is not skilled enough.
- . One person can cover a job for a period shortest that the defined in his contract.
- . One person can not cover more differents job in the same day that defined his contract.
- . One person can not do more jobs that is allowed in his contract.

4.2 Looking for function.

To fix both the variable instantiation order and the value selection, a function has been designed to measure the convenience of sombody entering a job in a period.

This function takes into account the fitness between the employee skillness and the skill needed to cover the job, and the time that the employee should be assigned to that job.

This function is evaluated for every people and every job, being used to lead both the choose-value and choose-variable.

After every instantiation, the function is reviewed.

6. Performance.

System is currently running in a PC.

The amount of data that is managing daily is around a hundred and fifty employees with fifty request period. All this involves the management of over seven thousand constraint-Variables at the same time.

The performance time is set about seven minutes a day.