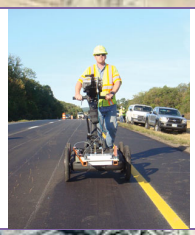
THE COMPLEX PARAMETERS THAT ARE USED FOR ROUTING RESULTS ASSESSMENT AND COMPARISON

Parameter	Parameter explanation	Expected result		
Number of assigned activities	The value of assigned activities defines the profit	Should be maximized by routing		Assessment of profit
Price of losses (costs)	Sum of losses gained because of travel, overdue, SLA violation	Should be minimized by routing		
Rout density parameter	Defines the efficiency of workforce usage	If all activities are assigned it should be minimized otherwise maximized		Assessment of efficiency
Value of overtime	The losses that associated with the extra time of work for each tech.	Shod be minimized by routing		

TECHNICAL DESIGN

Input parameters from the rhs server

Assessment of profit and loss that was obtained by the routing is based on the parameters of penalty prices of overdue, travel and SLA violation.

AA *- Assigned Activities*

$$AA = \text{raw\_total\_activities-raw\_not\_assigned\_activities}$$

OvC *– Overdue cost*
TrC *– Travel cost*
SlC *– Sla violation cost*

$$OvC = \frac{\text{sum\_overdue\_time}}{AA}$$
$$TrC = \frac{\text{sum\_travel\_time}}{AA}$$
$$SlC = \frac{\text{sum\_sla\_violation}}{AA}$$

RP *- Average profit on each assigned job*

$$RP = \frac{\text{info\_sum\_assigned}}{AA}$$

Target vector*

OvC	*TrC*	*SlC*	*RP*
0	*0*	*0*	*1*

**0 – decreasing is preferable*
**1 – increasing is preferable*

Normalized Target parameters

AAs – percentage of assigned activities

$$AAs = \frac{\text{AA}}{raw\_total\_activities}$$

AL* *- Average loss on each assigned job*

$$AL = \frac{\text{sum\_overdue\_time+sum\_travel\_time+sum\_sla\_violation}}{AA}$$

Complex target vector

AAs	***AL***
1	*0*

0 – decreasing is preferable
1 – increasing is preferable

*In order the parameter ***info_sum_assigned*** is not available for all the routing versions, the relative assessment of losses is calculated by dividing the maximum value of losses(AL) from the all compared results.

Assessment of efficiency

The **complex assessment of effective time** is formed with the indexes represented below.

WT *– work time*

$$WT = \text{raw\_work\_time\_sum+raw\_travel\_time\_sum+raw\_waiting\_time\_sum}$$

RD *– rout density*

$$RD = \frac{\text{raw\_work\_time\_sum}}{WT}$$

Ov *– overtime*

$$Ov = \frac{\text{raw\_overtime\_soft\_sum+raw\_overtime\_hard\_sum}}{providers\_used}$$

OvWt *– percentage of overtime in the Work time*

$$OvWt = \frac{\text{Ov}}{WT}$$

Complex target vector*

RD	***OvWt***
1	*0*

Summary assessment

Summary target vector

According to the essential meaning of the rout density parameter and its level of significance the target parameter of this value depends on the percentage of assigned activities, so the target vector has two different options:

1. All activities are assigned (AAs==1)

AAs	***AL***	***RD***	***OvWt***
1	*0*	*0*	*0*

2. Not all activities are assigned (AAs!=1)

Tvector:

AAs	***AL***	***RD***	***OvWt***
1	*0*	*1*	*0*

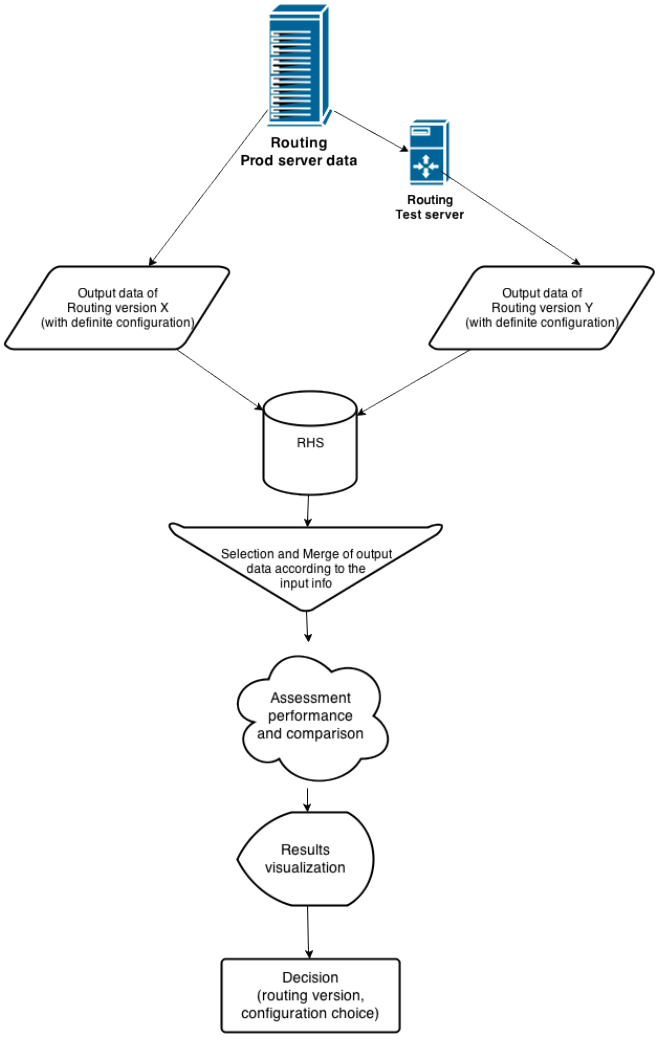
The ***summary assessment*** is calculated using the value of correlation between the calculated and target vectors. the Pearson product-moment correlation coefficient between the ***Tvector*** and $\boldsymbol{N\_rout}$(constructed with the routing results);

$$r = \frac{\sum(\boldsymbol{N\_rout} - E(\boldsymbol{N\_rout}))(\boldsymbol{Tvector} - \boldsymbol{E(Tvector)})}{\sigma_{\boldsymbol{N\_rout}}\sigma_{\boldsymbol{Tvector}}}$$

The value r is calculated for every routing result and the comparison of these values is performed for the similar routing run id. The higher it is for the specific case the better quality of rout can be registered. The most probable value of this r value is used further.

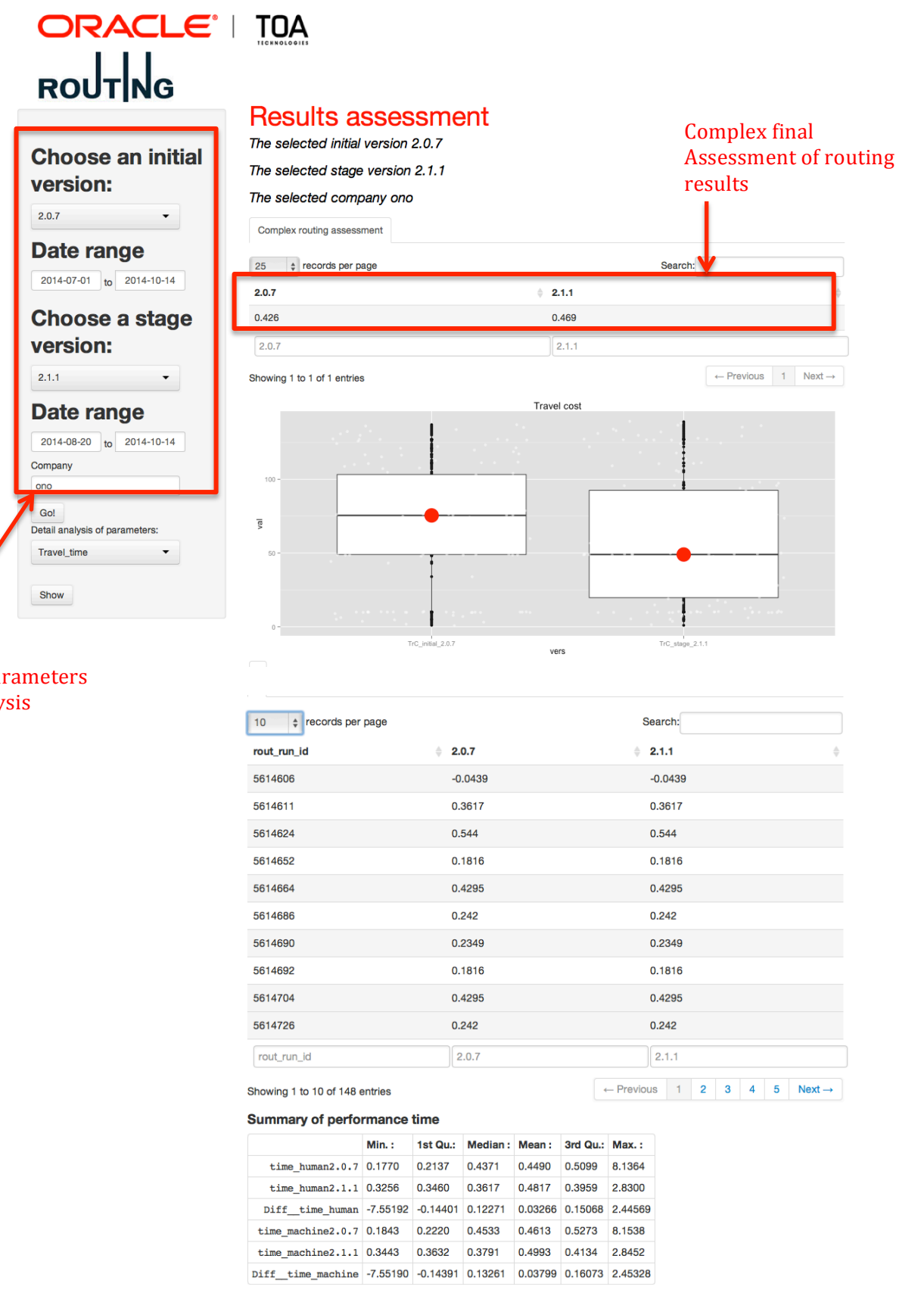
Now the comparison is developed using the Rstudio environment and results of assessment for all the companies are calculated.

Routing analysis(comparison) flow



SCREENSHOTS OF APPLICATION

Ono



Virginmedia

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ROUTING

Choose an initial version:

2.0.7

Date range

2014-07-01 to 2014-10-14

Choose a stage version:

2.1.1

Date range

2014-08-20 to 2014-10-14

Company

vm

Go!

Detail analysis of parameters:

Assigned_activities

Show

Results assessment

The selected initial version 2.0.7

The selected stage version 2.1.1

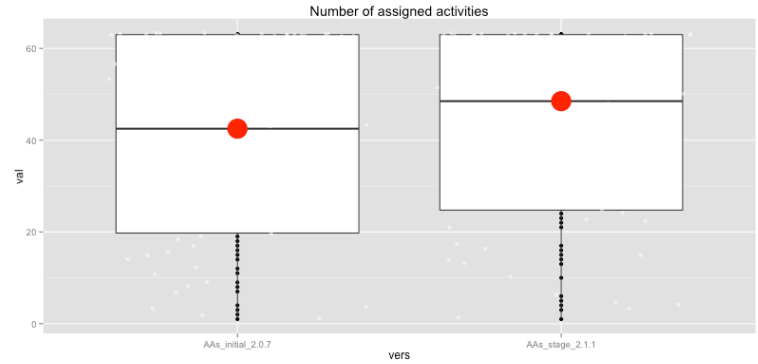
The selected company vm

Complex routing assessment

25 records per page Search:

2.0.7	2.1.1
0.498	0.547
2.0.7	2.1.1

Showing 1 to 1 of 1 entries ← Previous 1 Next →



10 records per page Search:

rout_run_id	2.0.7	2.1.1
2104325	0.6706	0.6813
2104326	0.5197	0.4678
2104327	0.4335	0.4547
2104328	0.5202	0.5514
2104329	0.4889	0.5817
2104330	0.6815	0.6305
2104331	0.436	0.4433
2104332	0.4142	0.4343
2104333	0.5461	0.5509
2104334	0.4186	0.4443
rout_run_id	2.0.7	2.1.1

Showing 1 to 10 of 60 entries ← Previous 1 2 3 4 5 Next →

Summary of performance time

	Min. :	1st Qu.:	Median :	Mean :	3rd Qu.:	Max. :
time_human2.0.7	3.288	9.861	19.552	46.225	44.064	374.924
time_human2.1.1	2.389	18.395	54.601	144.159	127.473	1937.656
Diff__time_human	-140.943	4.997	30.902	97.934	91.983	1711.712
time_machine2.0.7	3.296	9.879	19.570	46.238	44.082	374.947
time_machine2.1.1	2.406	18.410	54.615	144.174	127.487	1937.672
Diff__time_machine	-140.952	5.002	30.900	97.936	91.984	1711.710