

GENERATING ORACLE REPORTS FOR THE NOM PROJECT

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INTRODUCTION

For my research this semester, I focused on generating reports for the NOM simulations.¹ My task was to automate a lengthy process that the scientists had been doing step-by-step with Microsoft Excel. To automate this process, I utilized the functionality of Oracle Reports. Having never used Oracle Reports before, I had to go through many tutorials and frequently asked questions pages. Links to the pages I found most helpful are in the *References* section. Once I was familiar with Oracle Reports, I found it fairly straightforward to generate usable graphs.

METHODS

Even though I had been on the NOM team for a couple semesters, I had a lot of trouble getting started this semester. First, the link to download Oracle Reports was not working. It was only after about a week trying that I figured out that I had to add a '-west' to the URL to use the proper download server. This was particularly frustrating because they did not mention this anywhere on their site and only had one download server listed. The second problem was finding a machine to run the software on. My personal computer did not have the required operating system and I did not have the administrative privileges that I needed to install it in a cluster. To solve this problem, we set up a computer in the graduate student offices. I formatted the hard drive and installed Microsoft Windows 2000 Server. Then, I was able to successfully install Oracle Reports, which is bundled with the Oracle Developer Suite 10g. To install Oracle Reports, you must install the whole Oracle

Package. The last setback was getting everything configured to access the proper server and database. With the kind help of a graduate student, I was able to get everything up and running.

When I started my work, there had already been some reports generated for the [NOM website](#). These reports were fairly simple, but very functional. I immediately sought feedback of the scientist I was working with to see what she thought of the graphs. At this time, there were two graphs available: *Total Adsorption vs. Time* (Figure 1) and *Adsorption vs. Molecule Weight* (Figure 2). The scientist only wanted a few simple improvements to these graphs. First, she wanted to show the percentage of all molecules adsorbed for the y-axis instead of number adsorbed in the *Total Adsorption vs. Time* graph. This change was difficult, because the data we were accessing in the database did not store the total number of molecules in the system. We had to change how the simulation ran and also how the database stored data to get this to work. Also, the scientist wanted the axis labels slightly modified. On the *Adsorption vs. Molecule Weight* graph, she was confused by the x-axis. It had numbers 1-11 on it, which correlated to the molecule numbers in the system. Because she did not know which molecule number represented which molecule weight, she requested either the x-axis labels be the molecule weight or that we have a legend indicating the information. Again, this request required modification to the simulation and to the database, as we were not storing the molecule weights in the database. Two graduate students made the modifications to how the simulation ran, allowing us to access the data the scientists wanted. In the meantime, I made some actual reports for a specific simulation. I added a table for the

molecule weights in the database for my simulation and generated a rather dynamic report. The report allowed the user to enter the start and end time steps and also to select the particular molecule they wanted to see. This was for the *Adsorption vs. Molecule Weight* graph. Based on my modifications, I renamed the graph *Total Adsorbed vs. Molecule Weight*. Figure 3 shows this new graph for a specific molecule weight. I also was able to reproduce the *Total Adsorption vs. Time* graph, but was not able to add the request that it display a percentage on the y-axis because we did not know that information. I renamed it *Total Adsorbed vs. Time Step* and it is shown in Figure 4.

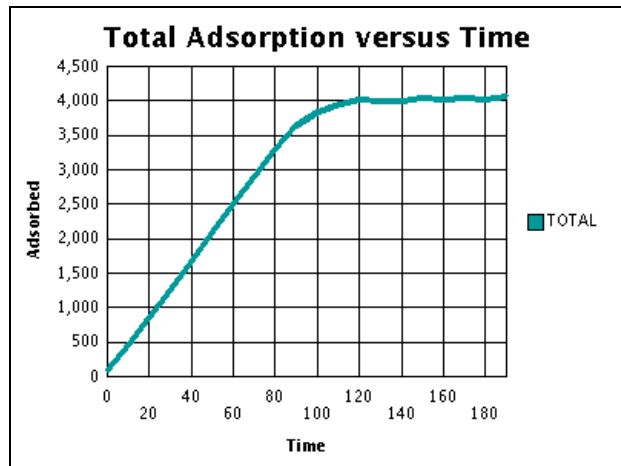


Figure 1

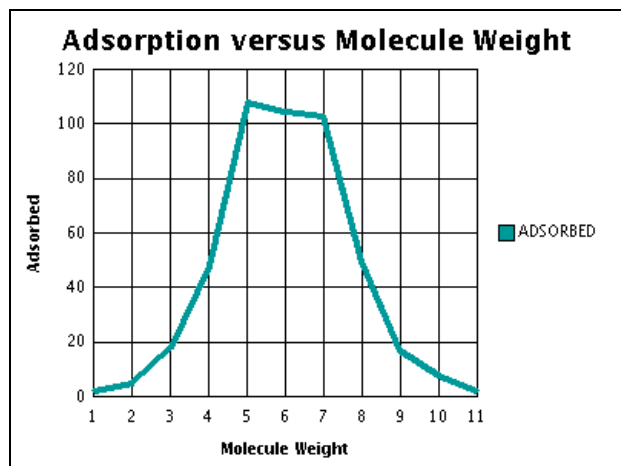


Figure 2

Step-by-Step Directions to Generate a Simple Graph

- 1) Open Oracle Reports Builder (make sure it is properly configured to access the correct database)
- 2) Select the *Build a new report manually* option and click *OK*
- 3) In the *Report Editor - Data Model* window that pops up, click the *SQL Query* button (middle row, second column) on the left toolbar (Figure 5)
- 4) Right-click in the workspace and either enter the query or click *Query Builder* to use the interface to generate the query
- 5) Click *OK*
- 6) Click *View* then *Change View* then *Web Source* on the main toolbar
- 7) Scroll down the *Web Source* window and click the cursor just above the `</body>` tag
- 8) Click *Insert* and then *Graph* on the main toolbar
- 9) Click *Next*
- 10) Click *Line* for the Graph Type and leave the default option for Graph Subtype
- 11) Click *Next*
- 12) Select the values you want for the x-axis then the values for the y-axis (these values are based on the SQL query you have entered)
- 13) Add titles and axis labels through the following screens
- 14) Click *Finish*
- 15) Click *Program* and then *Run Web Layout* on the main toolbar to see the report you generated

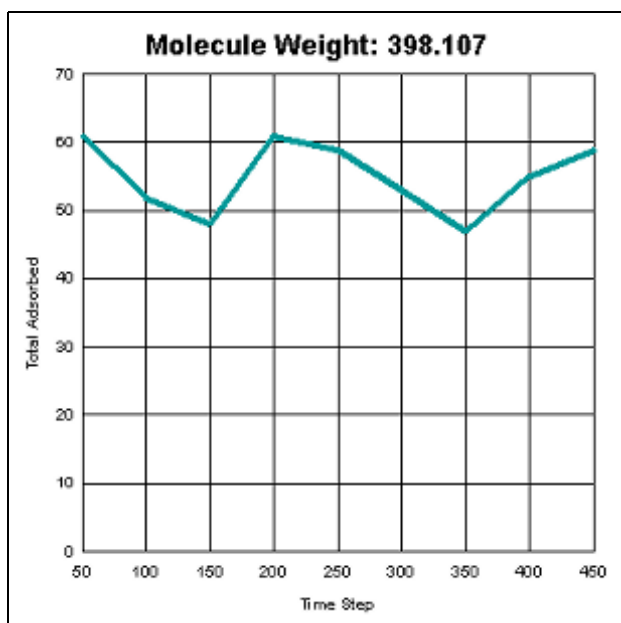


Figure 3

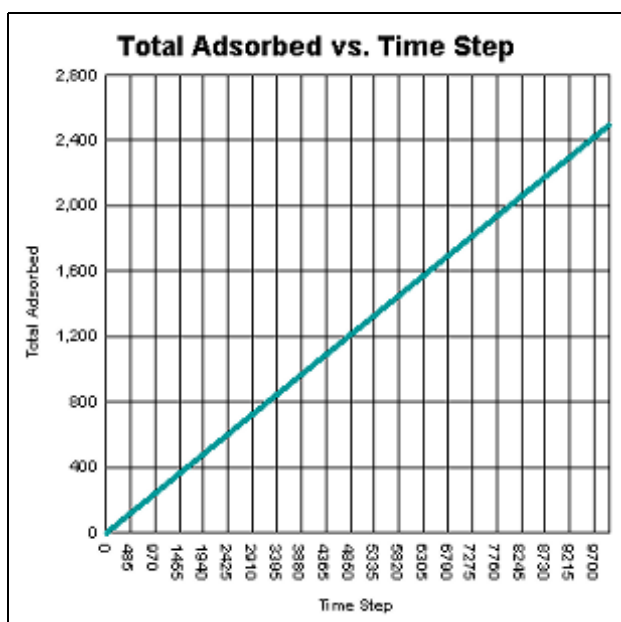


Figure 4

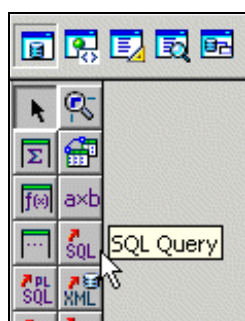


Figure 5

RESULTS

Everyone was rather pleased with the results. After the proper modifications had been made to the simulation and the database, it was fairly straightforward to make the changes to how the graphs were displayed. I was able to both tidy up the graphs and to make them a little more professional. What we ended up with was exactly what the scientist wanted for the graphs. For the *Total Adsorption vs. Time* graph, we were able to change the y-axis to display the percentage of all molecules rather than total for a particular molecule type. For the *Adsorption vs. Molecule Weight* graph, we were able to add a legend to display the molecule weights. We also had it display links so you could choose a particular time step region to view the results. This was done with bind variables and allowed the user to see how the simulation proceeded over time. For all the graphs, we used fewer than 10 data points. This is because the database stores information for every time step (often greater than 10000 rows) and we don't want the graphs to take too long to generate. The purpose of our reports is simply to allow the scientists to get an idea of how their simulation ran. If they want more comprehensive reports, they have the option of downloading all the data and graphing it themselves.

CONCLUSION

As mentioned above, the reports that we generate on the [NOM website](#) are very useful to the scientists. We have effectively automated the long and detailed process of manually generating graphs, while still providing them the data to do the long and detailed process. The graphs we display are clean and generate quickly, showing only the most relevant data to the simulation. We also designed them so that adding future graphs could be

performed very easily. Everyone is very pleased with our work.

FUTURE WORK

In the future, it would be useful to add more reports to the [NOM website](#). To do so, we would again speak with the scientists and see the kind of reports they would want to see. In addition to doing the simple line graphs that we used, Oracle Reports offers many other types of graphs. Perhaps showing the scientists these options would help them decide what new graphs to add next.

REFERENCES

[Getting Started with Oracle Reports](#)

[Graph FAQ with style](#)

[Oracle Developer Suite 10g Disk 1*](#)

[Oracle Developer Suite 10g Disk 2*](#)

[Oracle Reports Building Reports – Contents*](#)

*requires login

- [1] L. Arthurs, P. A. Maurice, X. Xiang, R. Kennedy, G. R. Madey. *Agent-based stochastic simulation of natural organic matter adsorption and mobility in soils*. Eleventh International Symposium on Water-Rock Interaction, June 2004. [Link](#)