Golf Math

New Mexico Adventures in
Supercomputing Challenge
Final Report
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Executive Summary

We have chosen to simulate the motion of a golf ball in flight. To limit the scope of our project, we have chosen to figure out if a human being with reasonable strength could hit a hole in one. We have also limited the scope of our project in other ways. In stead of accounting of variable air density, we have decided to stick with one air density that is uniform from the surface of our simulated Earth to our simulated infinity. We have also limited the scope of our wind simulation on the ball. Instead of variable winds, with gusts and lulls in the wind, we have chosen to simulate wind uniformly from the surface, up. The wind speed does not change.

Program “golf.cpp”

```
int main()
{
 // Variables used
 float ball_mass;  // The mass of the ball
 float clubhead_mass; // The clubhead mass
 float max_dist = 0; // Used later, used to determine if the current
velocity makes the ball go further
 float max_clubheadveloc = 0;  // Ditto
 float course_distance;  // User inputted course_distance
 cout << "Please enter the head mass of your club: " << endl;
 cin >> clubhead_mass;
 cout << "Please enter the ball mass: " << endl;
 cin >> ball_mass;
 cout << “Please enter the distance from the tee to the hole: “ <<
endl;
cin >> course_distance;
 //  Loop through all the values for velocity
 for(int i = 0; i < 150; i += .001)
 {
 float distance = (i * 1.67) / (1 + (ball_mass/clubhead_mass));
 if(distance > max_dist)
  max_clubheadveloc = i;
  max_dist = distance;
 }
 cout << "Your ball will have gone " << distance << "feet with no
wind" << endl;
if(course_distance < max_dist)
cout << “You can make a hole in one on this hole” << endl;
else
cout << “You cannot make a hole in one on this hole” << endl;
}
```

Project Problem Definition

Our project problem is to decide if a human being can reasonably hit a hole in one on a course with given environmental conditions. We believe that on a course less than 400 yards a human being can hit a hole in one with the right conditions.

Method of Solving

We started our project out with our research. We found equations that would determine the distance a golf ball can fly. This turned out to be more difficult than we originally thought it would be. We were able to find equations on how far the ball flew, not how the wind effected the balls flight. Then, once we had that information, we incorporated it into a program.

The equation we used to simulate the distance the ball flew was:

Distance = (club_head_velocity * 1.67)/(1 + (ball_mass/club_head_mass))

club_head_velocity is the velocity of the club head at time of inpact.

ball_mass is the mass of the ball

club_head_mass is the mass of the club head weight.

Project Conclusion

In conclusion we have put a lot of time and effort in our project and we have succeeded in putting together a program that will do what we want it to do. Wind was not simulated because of research shortfalls. We did not think to research wind, thinking is was simple vector math. However, in the rush to finalize our short program, we realized that the method of solving did not account for wind or adding in a wind simulation component. This is noticeable especially in the equation we have used to determine the distance the ball will go. The equation is a no-wind simulation of the ball.

We have also learned that we need a project mentor. The difficulty of finding useful information with regard to our project was difficult. We started off this project with a project mentor, but unfortunately we did not capitalize on his expertise and we lost touch.

In addition, we have learned that proper research is more than easy. We have learned that the internet is not the proper place to base a whole project off of. We did not look into any books, papers, studies, etc that were available at the public libraries. Proper research is also something that cannot be rushed. We had rushed our project the whole time, not taking the time to verify what we have done.

In conclusion, we have learned that laziness does not pay off.

Thanks and Acknowledgements

http://www.bs-sports.co.jp/english/basic_of_golf_club/basic_of_club_2.html

http://ffden-2.phys.uaf.edu/211_fall2002.web.dir/josh_fritts/flight.html

http://www.hhs.homewood.k12.al.us/compsci/projects98/eteam/paper.html

The above sites helped immensely in providing equations, terminology, and insight into the game of golf.

Also, a special thanks goes out to Mr. Albert Simon, who prodded us along and never let us get too far behind. With him, we would not have been able to finish this project.