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Programming A Complex Java Application

Word Count:1782

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I. Investigation & Planning

The Goal:

The Goal of my Personal Project was to “program a complex Java application” that was multi-functional.To be more specific, I wanted to program a Java(Programming language) application using a lower level graphics library named OpenGL.This library is normally used by game developers in making standalone applications or game engines.

At the time of choosing what I would like to do for the personal project I was deeply interested in OpenGL and Java programming, therefore it was clear that I would be choosing such topics to learn and use in my project.So, my fondness for programming had led me to the Scientific and technical innovation side of the Global Context section, for the reason that programming alone is a technological aspect of innovation or creating something new.

After knowing what I wanted to do for my personal project, I immediately made a schedule for how I would be going through with the learning, and creation processes for the project.I started by researching the actual sources I would be using to learn how to program this idea in my head.This lead me to finding many sources, some more helpful than others, and using them in implementing my ideas into a actual project.Also after implementing my ideas into the project I used a website called “Trello” to plan and record my progress.

II. Selection of Sources

Demonstrate research skills:

The actual sources that I had used in the creation of this project include a youtube playlist by the “CodingAP”, some videos from another playlist by “GamesWithGabe”, some videos from again another playlist by “The Cherno”, documentation information from the actual LWJGL website, and stackoverflow.

First off, CodingAP’s playlist of LWJGL(the actual OpenGL Java library) was an imperative source of information throughout this project.This source had provided me with key information on the actual initial setup for the project,which was the hardest part of the project.the videos laid the foundation of the project that I would be building up later on.

Next, GamesWithGabe and The Cherno's playlist of LWJGL and general OpenGL videos provided me with side videos that helped my understanding of certain topics inside of OpenGL that I needed clarification of from the "CodingAP's" playlist.They also had provided me with programming information that helped me abstract and debug(to remove a bug(issue) in the code) my program, in which quickened my progress, and helped me overcome walls blocking my progress.

Lastly, information from the LWJGL documentation site and the stack overflow site mostly helped in providing debug information for points of pure hopeless confusion in programming.These sources were only used in super specific situations that held up my progress significantly, proving them as a useful source of information in the project.

There was only a single source of information that I was planning to use but decided not too, and that was a youtube playlist by the "ThinMatrix".This youtube playlist though seemingly a helpful source of information for a project such as this one, uses outdated and broken LWJGL programming techniques that would be more harmful than helpful inside of a project such as mine.

III. Taking Action

Application of Information:

After researching the sources for my project I decided that it would be best that I progress the creation of the project while watching the tutorials for information.This was done by turning on the current CodingAP video I was on, and opening the IDE(integrated development environment) programming my application based upon the CodingAP video.If I had not understood something inside of the CodingAP videos I would use the other playlists as reference, and if something was still wrong and my progress was still halted, then I would use the other websites for sources.

In doing this process I found that this project was going to take longer than I initially anticipated, especially when planning it and marking progress with Trello.At a certain point in the progress of the project I decided that I would reduce the scope of the actual application in the project.This is also mainly due to the fact that the actual complex aspect of the application was going to be the code itself rather than the visual features it produces.

At a certain point in watching the CodingAP videos and programming along with them, I had decided that my programs abstract foundation was ready for me to detach from the videos and start free programming on my own.In free programming on my own, I started to rely on the other sources a bit more in the creation of more higher abstracted methods in the project.Some of the foundational aspects of the project would include the methods for creating and rendering objects, while my own methods were of rendering those objects in a program efficient way.

A normal programming day for this project during the foundation creation would go like this: I open the IDE, I turn on the current CodingAP video, I program along with the video rewatching parts I didn't understand or had a issue with, if I still didn't understand I opened a Games With Gabe video or The Cherno video trying to understand it or solve it from their perspective, if I still haven't understood it or had a solution then I used the LWJGL docs site or stackoverflow for information, and then I would continue programming along with CodingAP till I found a stopping point.

A normal programming day for the free programming part of the project went like this: I opened the IDE, I thought of things I could do that day to abstract my program further, I tried implementing the ideas through my own knowledge first, if I was not successful I used The Cherno or Games with Gabe, if I still was not successful I used the LWJGL docs site or stackoverflow, and then I finished my abstraction and stopped.

Achieving the Goal:

Unfortunately, I had not completed my overall goals for the project.I had set out to make a multi-functional program that a person could use in general or for entertainment, and what ended up happening was a negative quadratic function of progress.Why I explain it that way is to mentally show a graph of progress in the form of a negative quadratic.Over time the negative quadratic initially progresses upward with more work getting done in less time, then it hits a plateau of progress getting done at a certain amount of time, and then it declines with progress shortening as time moves on.Of course this quadratic would have to be very wide to properly demonstrate the progress over time.

The downward slope of progress over time in the negative quadratic function of progress had occurred due to me starting to free program the project on my own.What would happen is I would go out and try to program certain

aspects of my project and only some of them actually working as intended.Along with this some of them required me to refractor(recode a portion of the program) some of the program so that they would work.This took up a large portion of time and delayed my progress.This is especially apparent in portions of the free programming that had mathematical or large logical concepts to them, where I had to keep hammering at a nail that only went in inch by inch and even stopped at some points.An example of this was when I tried to implement textures inside of my program, in which would have made abstracting my program a whole lot easier.When trying to implement textures in my program any source I used to try and help me implement this feature would bring me a certain distance of progress inside of my program, but for some reason all progress would just be stopped.I kept hammering at this nail for a super long time until I got it somewhat right, and I gave up on the idea of textures in my program because of its complexity.

In the end I had only achieved my goal to a proportionally foundational extent, where the significantly functional part of it was code that I had learned from the CodingAP, and a couple abstractions that I had made to work.These shortcomings can be seen inside of my public Trello board.

IV.Reflecting

Reflection on Learning:

Despite the shortcomings I had referenced before I believe that I had learned a lot from this project.I feel that I had learned a superb amount of not just programming but conceptual knowledge of computers.This project has taught me things that some people use in their real life jobs everyday.It has shown me how much work people have to put in creating programs that don’t just implement what they want, but run optimally enough as to not slow the processes of the computer and take up too much RAM(random access memory).It has also shown me the gigantic scope of things you can use computers to actually do.This project has without a doubt extended my knowledge of the science and technical innovation global context beyond what I thought computers ever were.

But this development of knowledge in computers was infinitesimal to the amount of knowledge I found out about myself.With a project such as this I found out a lot about myself, and how I cope with weekly deadlines for a project that is due months beyond the current date.This project has helped me in identifying issues within my work ethics that I can now progress on stopping, so that I can become a more efficient and harder worker who procrastinates less, and is able

to deal with long term deadlines.It has also helped me develop an ambition for what I do, and help me actively seek out to get work done so that I can do what I want not just in highschool but in college, and maybe in real life after the fact.

Now, in retrospect of the project I have found that if I were to do this again I would do many things different, but not in the easy way.Instead of using Java I would use C++(programming language) and the actual internal OpenGL library making it harder on myself with memory management.I would also dedicate more time for myself to actually do the project during a week, and not stop till it’s done.Lastly I would also implement even more abstractions in the program making it even more easier to use.I would make the project harder because I believe that with my newfound knowledge and skills I would get it done and make it without a doubt better than this one.

Appendices

July 4, 2020 5:23 PM

Date: July 2nd, 2020

Work completed this week:

-I have learned even more about the library I am using and I had incorperated an input system inside of my project.I had also incorperated the actual graphics part of my system too now and I have now a window that accepts input and a background color.

Resources consulted:

-The lwjgl website:https://www.lwjgl.org/, also a video series to help: https://www.youtube.com/watch?v=fW19iG9Hkrk&list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b

Challenges/difficulties faced:

-It was again hard learning about this concept and how it works inside of the code.

Evaluation of progress:

-I feel like I am on the right track for this project and that I still have so much to learn by the end of this.

August 2, 2020 4:32 PM

Date: July 10th. 2020

-I have learned more about the libraries that I am using in this project.Also I had incorporated more abstraction related elements into my project including a math folder, and and a way to draw triangles.This abstraction currently does not display the drawing of the triangles onto the screen.The reason for this is because I need a vertex, and a fragment shader to actually display the triangles.

Resources consulted:

-Primaraly these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b,, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide.

Challenges/difficulties faced:

-It was difficult to debug any issues that had occurred in the programming process and the tutorial had gotten it incorrect.It was a also difficult learning and understanding some of the concepts I was being taught.

Evaluation of progress:

-I definitely am on the right track in this programming journey, and in getting the project completed.

August 2, 2020 4:43 PM

Date July 15th, 2020

Work completed this week:

-I have learned lots more about this library I am currently using.I have finally incorporated a system that will read the shaders I have created to display the information passed into the shader onto the screen.So now I can use the drawing and math system I have created to draw a square to the screen, and to also color the individual vertices of the square.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b,, and helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide.

Challenges/difficulties faced:

-It was again difficult in debugging issues that had arose in programming the file reader for reading the shader files, and also sending information to the shader files so information can be displayed onto the screen.

Evaluation of progress:

-I am definitely on the right track in completing this project and learning a ton about the library that I am using to complete it with.

August 2, 2020 4:59 PM

Date July 29th, 2020

Work completed this week:

-I had learned more about the library I am using like every other week.But this week in particular there has been a significant amount of progress being made.I had finally made a system for rendering textures onto my objects.I had also made a system for making data that I can send to the shader to dynamically change the data of the object displayed onto the screen.This allows me to do something like constantly increase the size of the object on the screen every frame.This comes with more files and abstractions that had been written for this.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b,, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide.

Challenges/difficulties faced:

-It was harder this time debugging some of the issues pressented in writing this segment of code, but with a little from my resources I had gotten it done.

Evaluation of progress:

-I'm learning a ton and making significant progress, though I still need to keep at it.

August 2, 2020 5:04 PM

Date August 2nd, 2020

Work I have completed this week:

-Though the week has barley begun I had learned more about the library I am using like every other week.Also I have finally made a system along with a couple of abstractions for transforming any object rendered onto the screen.Now I can insert data for something like translation and the object will translate and move across the screen.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b,, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide.

Challenges/difficulties faced:

-It was again difficult in debugging all of the issues, but sense this was about abstracting data and creating data to help with transformations of objects it was more time consuming rather than difficult.

Evaluation of progress:

-I'm learning and doing a ton but there is still a lot more progress to be made.

August 13, 2020 8:00 PM

Date August 13th, 2020

Work I have completed this week:

-In this week I had currently successfully made abstractions inside of my program to represent a camera.Now when I start programming the actual things people will do with my program, I will be able to create the objects inside of the viewing space around the camera rather than inside of it.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide.

Challenges/difficulties faced:

-sense this was more or less creating abstractions and for when data will be displayed, it wasn't the most difficult thing in the world.I did have to debug a little though for inserting the data and code correctly.

Evaluation of progress:

-I'm learning a lot, but I still need to keep going.

August 29, 2020 3:18 PM

Date August 29th, 2020

Work I have completed this week:

-In this week I had again created more abstractions that I can use when programming the actual user based parts of my program. Also I had redone some of my early abstractions, to have a more clear code, and to be able to integrate batch rendering for textures.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide. Also some articles in stack overflow.

Challenges/difficulties faced:

-This one was one of the most difficult integrations into my project, because, I had to really understand how the program worked and specify keenly on how the program was going to work with the information that I was giving it.

Evaluation of progress:

-I am on track to starting the user based aspect of the project, and I am on a good track to get this project completed.

November 26, 2020 11:12 AM

Date November 26th, 2020

Work I have completed this week:

-In this week, I had finally laid out a visual plan for what my final product of my project will probably look like. In doing this I had figured out what I will be doing for video game section of the project, and that I will also be doing a file writing system to.I have also figured out the abstraction method I am going to be using for this project, and I figured that I would not be using textures in this project.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide. Also some articles in stack overflow.

Challenges/difficulties faced:

-In this section it was difficult to think about how to finally get everything done, and this is because the graphics library I am utilizing for this project is very complex. I have to think about what is feasible at this moment, and what I am actually able to do.

Evaluation of progress:

-I still have work to do, but in spite of that I am making steady progress.

December 13, 2020 7:54 PM

Date December 13th, 2020

Work I have completed this week:

-This week I have made an class further abstracting the ability to create objects inside of my project. The purpose of the class, I had made, was to hold object information on all 27 letters in the English alphabet. The reason for doing this is to easily allow me to create objects representing letters inside of my application, now all I have to do is create an object of the new class with the number of the letter I want, and when I send the object data to the renderer it will easily render the letter. I have also made object creation easier on development.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide. Also some articles in stack overflow.

Challenges/difficulties faced:

-The challenges faced in this was trying to figure out a good way to abstract my classes, and create the vertex information for the object, in order to make it easier on me to create the actual in application graphics.

Evaluation of progress:

-I still have work to do, but in spite of that I am making steady progress.

January 10, 2021 10:19 PM

Date January 4th, 2020

Work I have completed this week:

-This week I have mostly revised the documents, as said inside my last entry, and made some progress on making sentences based off the letter objects. I have made a new script in which takes a String variable, and has methods you can access that converts the string to graphical objects. These methods get returned and added to the world object to get rendered in the world. Also, in this week I have made two YouTube videos about how to program in Java. This is part of the giving back to the community section part of the project.

Resources consulted:

-Primarily these tutorials by CodingAp: https://www.youtube.com/playlist?list=PLaWuTOi9sDeomi2umQ7N8Lqs-GtE1H4-b, also some helpful tutorials by Games with Gabe: https://www.youtube.com/watch?v=VyKE7vz65rY&list=PLtrSb4XxIVbp8AKuEAlwNXDxr99e3woGE, opengl tutorials by The Cerno: https://www.youtube.com/watch?v=W3gAzLwfIP0&list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2, and documentation/information from the lwjgl website: https://www.lwjgl.org/guide. Also some articles in stack overflow.

Challenges/difficulties faced:

-It took time figuring out how I was going to do the tutorials, the algorithms for the new class, and how I was going to revise the documents to allow me to get my work done.

Evaluation of progress:

-I still have a lot of work to get done, and the more dedicated I am to it the more I will get out of it.

Work Cited

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