11:52:57 From JonathanKoning: Anyone else abnormally exhausted this week?
11:53:24 From Hernandez, Fransisco Javier: I woke up really late yesterday for some reason if that counts.
11:54:15 From Josh Bell: I was up until 3am doing project 1, I was having too much fun to stop

CG is addicting that way, I think. There is always “one more” thing you can add. 😊

12:03:17 From Zhao, Liang: Prof, do u have any recommended interesting books about computer graphics?

Here’s a free one: [http://cs.oregonstate.edu/~mjb/cs550/rscfullbook.pdf](http://cs.oregonstate.edu/~mjb/cs550/rscfullbook.pdf)

This one is my go-to reference book (but I wish they would come out with a 10th edition):

12:04:03 From Lloyd, Doug: if our drawing is out of center in the viewport is it generally better to try to adjust the viewport or transform the object into place?

You might be able to more easily make this better by changing the call to gluLookAt( ) (i.e., don’t move the object – move how you are looking at it). Put the look-at x,y,z in the center of the object.

12:09:41 From Li, Chenghao: What does Up vector means?

Imagine an arrow coming out of the top of your head. The up-vector is the (x,y,z) of where that arrow is pointing (and thus pulling your head with it).

12:15:43 From Hernandez, Fransisco Javier: So we would use a display list to rotate multiple separate spheres in unison?

I would probably try something like this:

```c
for( int i = 0; i < NUMSPHERES; i++ )
{
    glPushMatrix( );
    glTranslatef( xsphere[i], ysphere[i], zsphere[i] );
    glRotatef( CurrentRotationAngle, 0., 1., 0. );
    glCallList( SphereList );
    glPopMatrix( );
}
```

12:25:07 From Nguyen, Quan M: what is the yellow line? [in the Mars program]
12:25:19 From Halaapiapi, Leni Tualau: The flight path.
12:25:21 From Zach Parsons: Its the flight path around mars
It is a smooth curve fitted through the flight path-defining points.

12:25:48 From Mahmoud, Ibrahim : I can make something real??

Yes! All it takes is data. 😊

12:26:06 From Sierra Freihoefer : How many triangles are in this? [the Mars sphere]

It's approximately 1,000,000 vertices.

12:28:22 From Hastings, Arman Keegan : Then texture mapping?

First add the elevations at each vertex. Then do texture mapping to get the colors.

12:29:07 From Sriram Narayanan : R and theta?

Spherical coordinates are (R, theta, phi). The R is the basic radius plus the height at the (theta,phi). On a globe, theta would be longitude and phi would be latitude.

12:36:57 From Traffas, Logan Peter : What's the capacity of a display list? And what happens if you exceed it?

Limited by GPU memory. Don't know -- I've never been able to fill a DL. If you did, I suspect the driver would spill over and start quietly using CPU memory as well.

12:37:01 From Jacob Eckroth(He/him/his) : how many lists can we have?

Since the DL number is a 32-bit unsigned integer, which would imply that you could have 4B DLs. Surely you would run out of memory before then.

12:41:44 From Grant Haines : So SphereList is basically a pointer to a space in GPU memory?

Not a pointer exactly, but an integer, which is probably an index into a table that stores the real GPU memory pointer.

12:43:19 From Jonathan Koning : So Display Lists are useful when an object's coordinates are static?

Yes, but the DL object in the scene can be moved around using transformations.

12:44:29 From Pannapat Chanpaisaeng : You said glGenList gives you 10, does that happen when you call glGenLists(10)? just a bit confused because it's 1 in the slide

12:45:25 From Traffas, Logan Peter : glGenList gives you the index of an available display list. The parameter is how many display lists in a row you want it to give to you

In sample.cpp, we just needed one DL, so we used glGenLists(1 ).
If you needed 10, you could call glGenLists(1) ten times, or could call glGenLists(10). In the first case, you would get 10 separate DL numbers. In the second case, you would get one number, but could safely also use the 9 numbers after that.

12:46:38 From Land, Hunter: How would you free the display list from GPU memory?

glDeleteLists( firstDLnumber, numberOfDLs );

12:47:45 From Pannapat Chanpaisaeng: does it mean a single DL number can be used only once?

You can use the DL number again, but its glNewList( ) wipes out the contents of what that DL used to hold.

12:49:46 From JonathanKoning: so if we do SphereList = glGenLists(2)

It would let you create two DLs numbered: SphereList and (SphereList+1). What you put in each DL is up to you. There doesn’t really need to be any relation between what’s in each DL unless you want there to be.

12:53:04 From Traffas, Logan: I think you’d use it like this:

```c
start_index = glGenLists(2);
glNewList(start_index, GL_COMPILE);
....
glEndList( );
glNewList(start_index + 1, GL_COMPILE);
....
glEndList( );
```

```c
...
glCallList(start_index);
glCallList(start_index + 1);
```

This is correct, although another good use case is with a for-loop:

```c
#define NUM
start_index = glGenLists(NUM);
glNewList(start_index, GL_COMPILE);
....
glEndList();
glNewList(start_index + 1, GL_COMPILE);
....
glEndList();
```

```c
...
for( int i = 0; i < NUM; i++ )
    glCallList(start_index+i);
```
13:08:39 From Seale, Jett: is a teapot the graphics edition of hello world

Yes! It’s really an inside joke. It’s a very special-shaped teapot. In the movie *Toy Story I*, when Pixar animated the “tea party scene”, they used this teapot model just to crack up all the CG people.

13:09:35 From Lloyd, Doug: is its fine if our drawing for project #1 is wireframe right?

Yes, definitely.

13:09:49 From Pannapat Chanpaisaeng: Is it too late to ask what wireframe means?

It is the act of making a 3D model from lines instead of filled-in topologies, such as GL_TRIANGLES or GL_QUADS. Think of it as taking a wire coat hanger and bending it into some shape.

13:11:56 From Vinnie: so glutIdleFunc() holds up any further rendering until the pointed to function returns?

No, it causes that function to be called whenever GLUT has nothing else to react to. The purpose of that function (Animate in our case), is to set something based on the time and return immediately.

13:22:41 From Hernandez, Francisco Javier: the one that melted cars near it?
13:23:00 From Nguyen, Quan M https://en.wikipedia.org/wiki/20_Fenchurch_Street
13:23:14 From Yuan, Tianle: hahaha
13:23:28 From Evan: deathlaser building
13:23:33 From Karimyar, Ali Yoseph: that building is so ugly
13:23:34 From Grant Haines: RL death star
13:23:49 From Morello, Zachary D: "Mr Lindsay said the developers had apologised and agreed to sort out the £946 repair costs."
13:23:57 From Morello, Zachary D: ONLY 1000 pounds????
13:24:14 From Rivas, Tyler James: “Fryscaper”

Amazing, huh? A CG ray-tracing program was later used to show how the sunlight on that particular day of the year got so focused.

13:41:01 From Gao, Liansong: Can I use some code from sample in my assignment?

Definitely!