Visualizing Complex Functions

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Project Goals

- Drawing complex functions
- Using shaded conformal maps
- Scaling axises
- User can choose pattern and shading
  - Point, Grid, Color Wheel, Custom Image
- User inputs the function, it doesn't come from a list
- Web based application
- Java applet
- Mathematically useful
- Animations
- Intuitive interface
- Save images

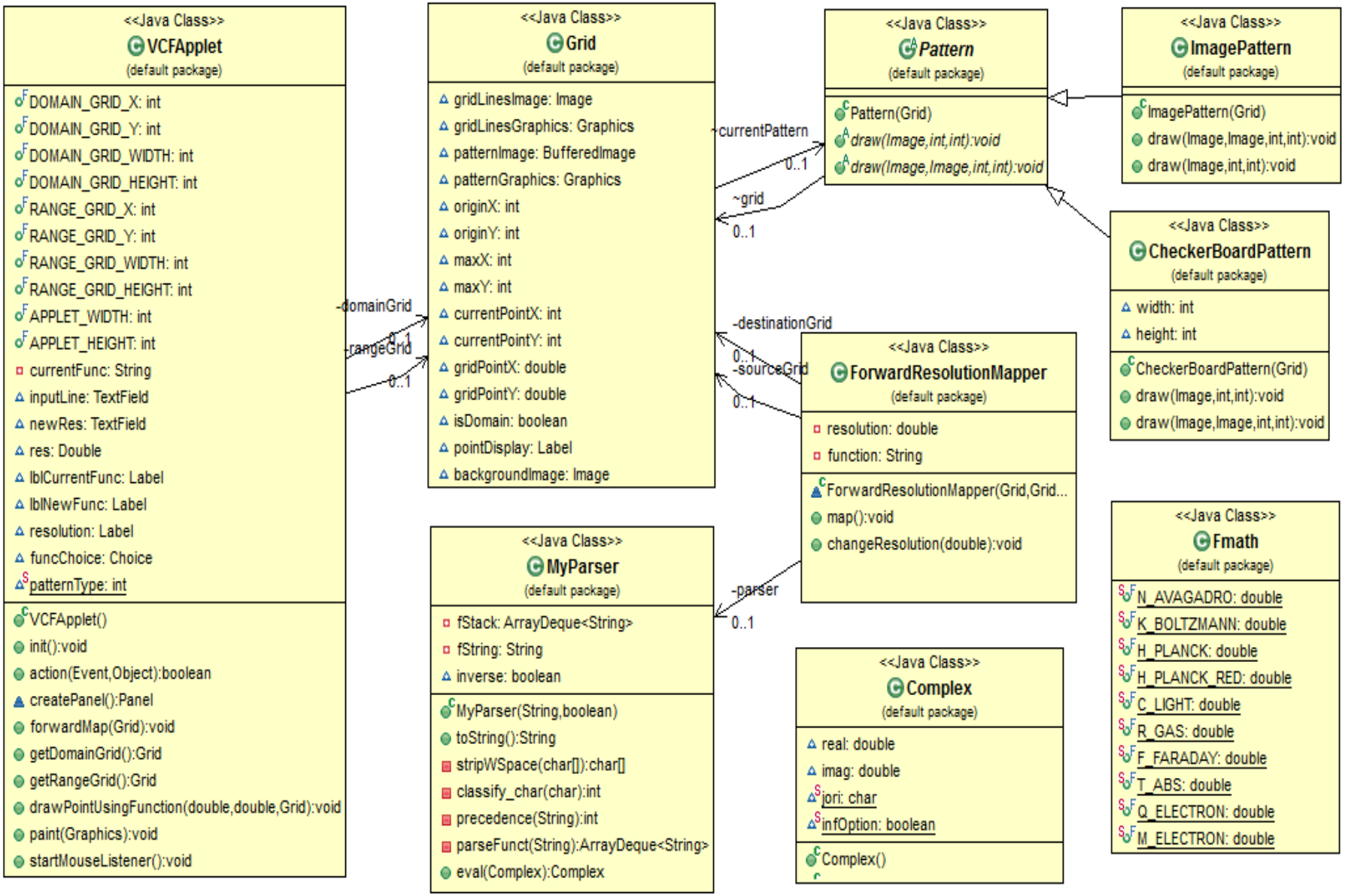
Technical Challenges

1) Saving cookies / files through the applet.

2) Fill in white pixels that are missed by forward mapping, and also determine the white pixels that shouldn't be filled in.

3) Quicker and more efficient forward mapper

UML Diagram


<<Java Class>>
VCFApplet
(default package)
DOMAIN_GRID_X: int
DOMAIN_GRID_Y: int
DOMAIN_GRID_WIDTH: int
DOMAIN_GRID_HEIGHT: int
RANGE_GRID_X: int
RANGE_GRID_Y: int
RANGE_GRID_WIDTH: int
RANGE_GRID_HEIGHT: int
APPLET_WIDTH: int
APPLET_HEIGHT: int
currentFunc: String
inputLine: TextField
newRes: TextField
res: Double
lblCurrentFunc: Label
lblNewFunc: Label
resolution: Label
funcChoice: Choice
patternType: int
VCFApplet()
init():void
action(Event,Object):boolean
createPanel():Panel
forwardMap(Grid):void
getDomainGrid():Grid
getRangeGrid():Grid
drawPointUsingFunction(double,double,Grid):void
paint(Graphics):void
startMouseListener():void
-domainGrid
0..1
-rangeGrid
0..1
<<Java Class>>
Grid
(default package)
gridLinesImage: Image
gridLinesGraphics: Graphics
patternImage: BufferedImage
patternGraphics: Graphics
originX: int
originY: int
maxX: int
maxY: int
currentPointX: int
currentPointY: int
gridPointX: double
gridPointY: double
isDomain: boolean
pointDisplay: Label
backgroundImage: Image
-currentPattern
0..1
~grid
0..1
<<Java Class>>
Pattern
(default package)
Pattern(Grid)
draw(Image,int,int):void
draw(Image,Image,int,int):void
<<Java Class>>
ImagePattern
(default package)
ImagePattern(Grid)
draw(Image,Image,int,int):void
draw(Image,int,int):void
<<Java Class>>
CheckerBoardPattern
(default package)
width: int
height: int
CheckerBoardPattern(Grid)
draw(Image,int,int):void
draw(Image,Image,int,int):void
-destinationGrid
0..1
-sourceGrid
0..1
<<Java Class>>
ForwardResolutionMapper
(default package)
resolution: double
function: String
ForwardResolutionMapper(Grid,Grid...
map():void
changeResolution(double):void
<<Java Class>>
MyParser
(default package)
fStack: ArrayDeque<String>
fString: String
inverse: boolean
MyParser(String,boolean)
toString():String
stripWSpace(char[]):char[]
classify_char(char):int
precedence(String):int
parseFunct(String):ArrayDeque<String>
eval(Complex):Complex
-parser
0..1
<<Java Class>>
Complex
(default package)
real: double
imag: double
iori: char
infOption: boolean
Complex()
<<Java Class>>
Fmath
(default package)
N_AVAGADRO: double
K_BOLTZMANN: double
H_PLANCK: double
H_PLANCK_RED: double
C_LIGHT: double
R_GAS: double
F_FARADAY: double
T_ABS: double
Q_ELECTRON: double
M_ELECTRON: double

Progress Summary

Module/Feature	Completion	To do
Website	20%	Help manual, description, applet placement, etc.
GUI	85%	User-friendly, calculator input?, button placement, etc.
Forward Mapping	90%	Fine-tuning needed
User Inputed Functions	100%	Finished
Parser	100%	Finished
Patterns	80%	Image pattern, enable uploading of image
Applet Internal Design	85%	Refactor code

Milestone 4

- Fix up forward mapping resolution issues
- Accept user image input
- Have the axises scaleable
    - Add more information to line markers
    - Linear, Exponential, Logs
- Try to consult a mathematician to review our program

Milestone 5

- Better error handling in parser, input, graphing, etc.
- Complete most of the website's features
- Disable range grid from being able to be clicked on
- Save images
- Animations
- Poster

Milestone 6

- Make animations run smoother and with more customization options, like frames per second and number of frames to take.
- Finish the website's descriptions and help menus
- Resolve any outstanding errors.
- Refactor grid and VCFApplet classes among others to be more readable.
- Manual
- Demo Video

Milestone 4 Task Matrix

Task	Paul G	Branden D	Bradley W
Forward Mapping Resolution	50%	25%	25%
User Image Input	25%	50%	25%
Scalable Axis's	25%	25%	50%
Consult Mathematician	12.5%	12.5%	75%

Questions?