

# GO For Information Displays

Anthony Starks  
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Go is great in the back end

A wide-angle photograph of a dramatic sky. The upper portion of the image is dominated by a large, bright white cumulus cloud formation. This main cloud is textured and layered, with some darker, more solid areas on its right side. Below it, the sky transitions into a darker shade of blue, with several smaller, fluffy white clouds scattered across the lower half. The overall effect is one of a powerful, natural scene.

But sometimes it's about the picture

Information Displays

Libraries and Tools

Lots of pictures

Why Go?



Edward Tufte

Display data for precise, effective, quick analysis,  
Small multiples, Optimizing the data-ink ratio,  
Visual and beautiful evidence.



Nigel Holmes

Designing for the context: The data visualizer asks: “What’s the data?”, the infographics designer: “What’s the Story?”

An interesting arrangement  
of text and graphics designed  
to convey a message.

# I hate pushing pixels

programs are so much  
better at it



Photo by deborahschillbach



**Kelsey Hightower** @kelseyhightower · Apr 10

Gophers will do anything to avoid writing Javascript.

**Ben Johnson** @benbjohnson

I wrote a full PhantomJS client in Go over the weekend. Still needs a higher level testing library though. [github.com/benbjohnson/ph...](https://github.com/benbjohnson/ph...)

7

25

108

# SVGo



`go get github.com/ajstarks/svg/...`

# OpenVG



`go get github.com/ajstarks/openvg`

# Deck



`go get github.com/ajstarks/deck/`  
`go get github.com/ajstarks/deck/generate`  
`go get github.com/ajstarks/deck/cmd/pdfdeck/`  
`go get github.com/ajstarks/deck/cmd/dchart/`



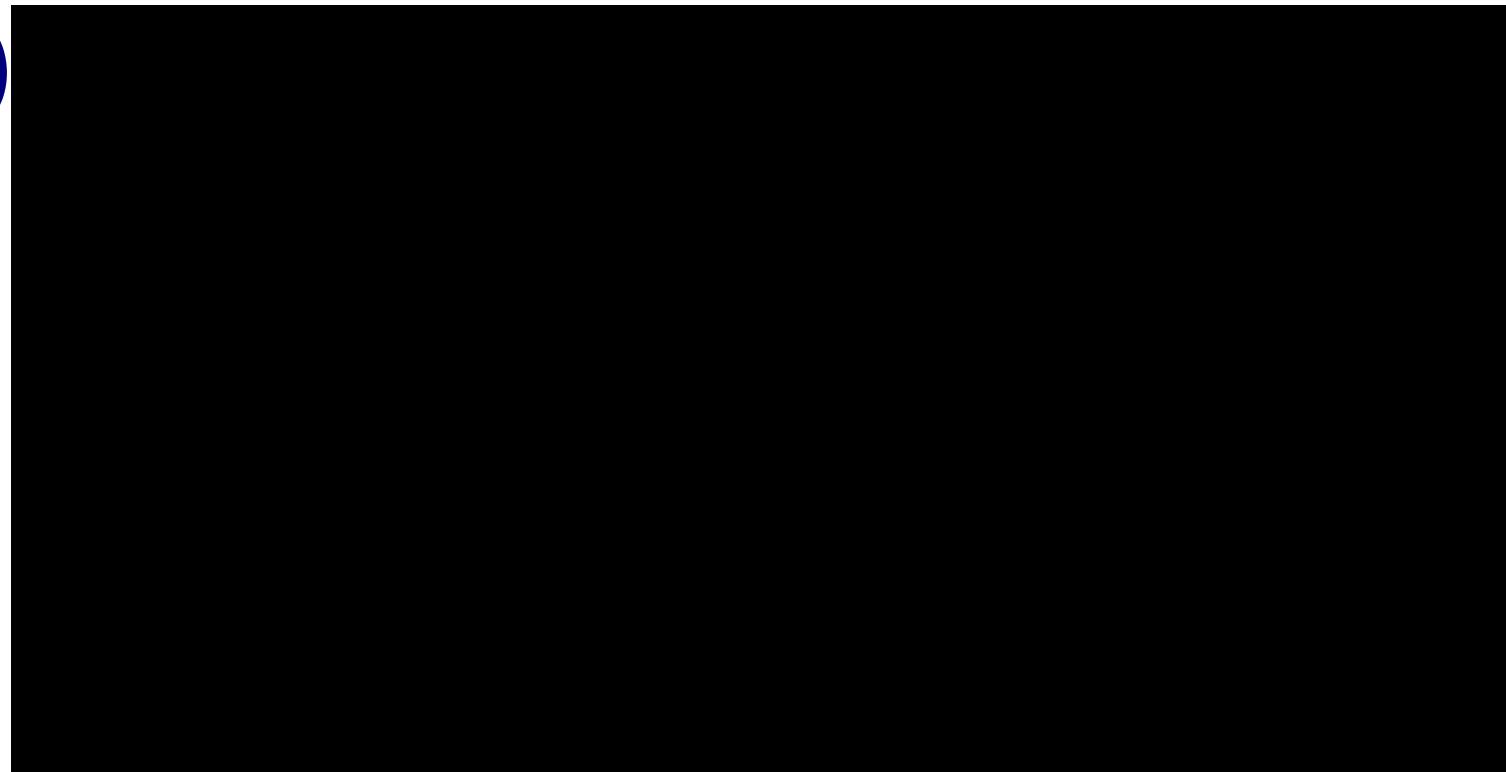
Element

Arguments

Rect (100,200,250,125)

```
<rect x="100" y="200" width="250" height="125"/>
```

(100, 200)



125

250

Element	Arguments	CSS Style
Rect	(100,200,250,125, "fill:gray;stroke:blue")	

```
<rect x="100" y="200" width="250" height="125"  
style="fill:gray;stroke:blue"/>
```



Element

Rect (100,200,250,125,

Arguments

`id="box"`, `fill="gray"`, `stroke="blue"`)

Attributes

```
<rect x="100" y="200" width="250" height="125"  
      id="box" fill="gray" stroke="blue"/>
```

(100, 200)



125

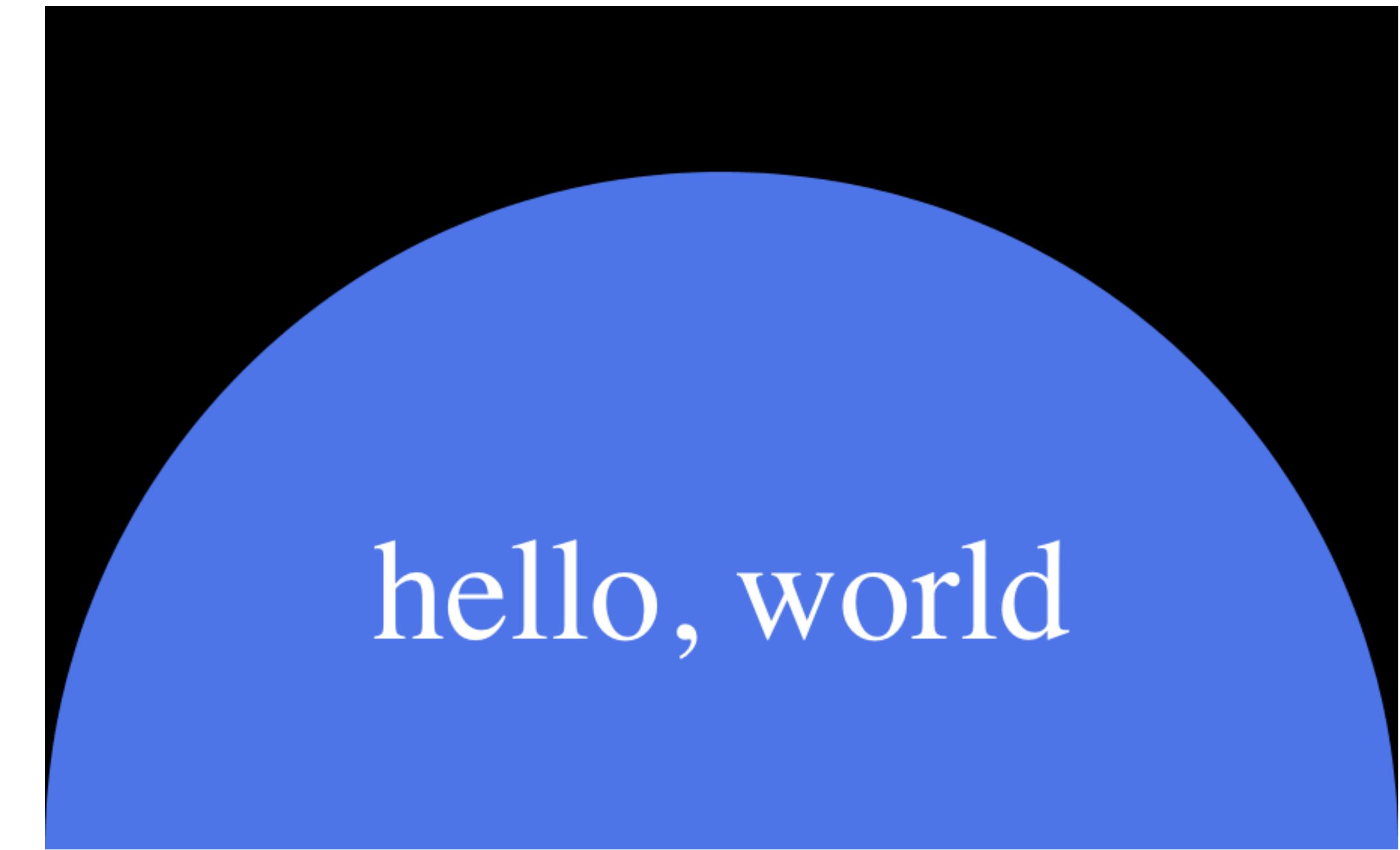
250

```
package main

import (
    "github.com/ajstarks/svg"
    "os"
)

func main() {
    canvas := svg.New(os.Stdout)
    width := 900
    height := 560
    style := "font-size:72pt;fill:white;text-anchor:middle"

    canvas.Start(width, height)
    canvas.Rect(0, 0, width, height)
    canvas.Circle(width/2, height, width/2, "fill:rgb(77, 117, 232)")
    canvas.Text(width/2, height*3/4, "hello, world", style)
    canvas.End()
}
```





Scale



Roundrect



fill:rgb(164,198,57)

Line

Circle

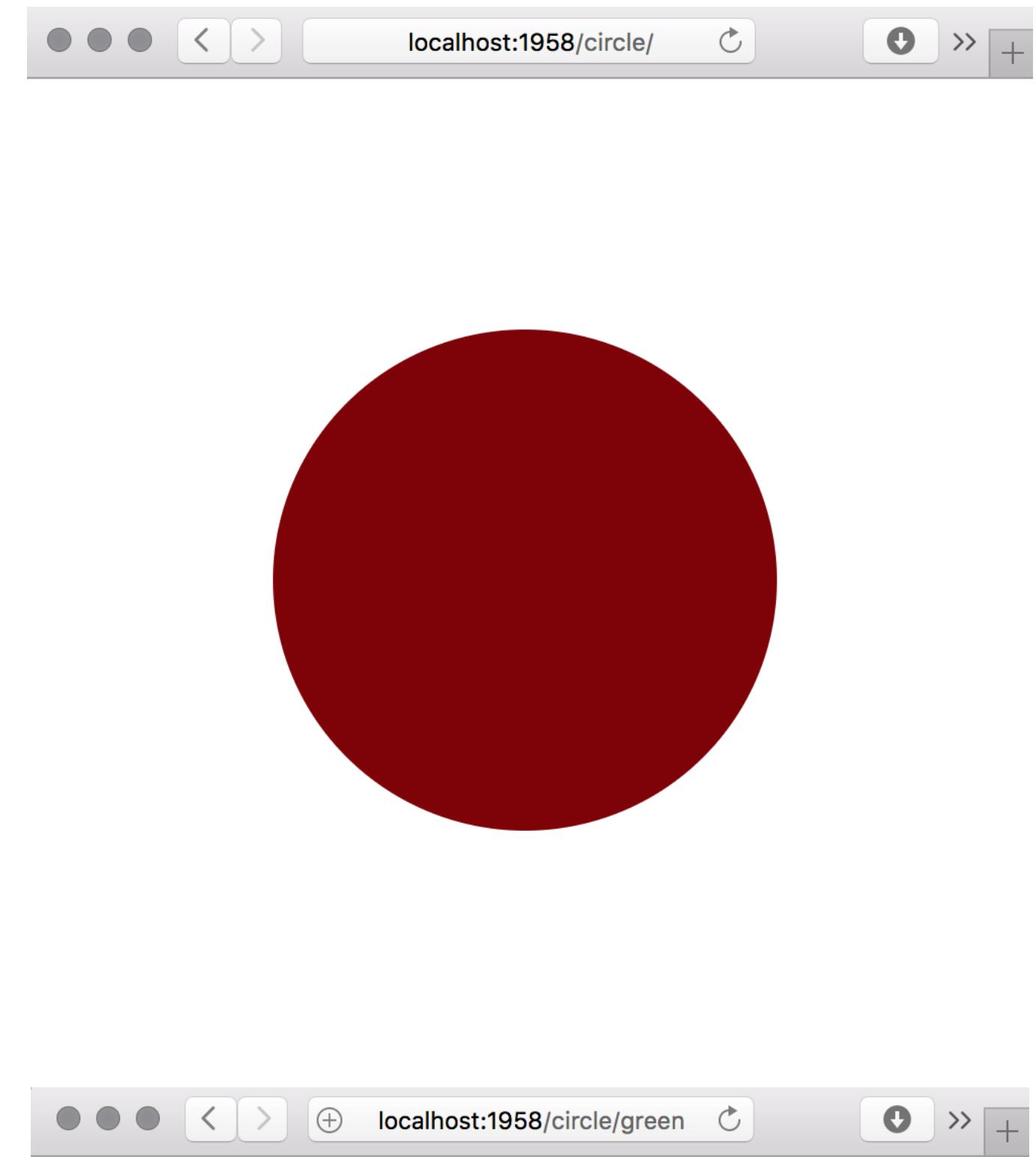
Arc

Line

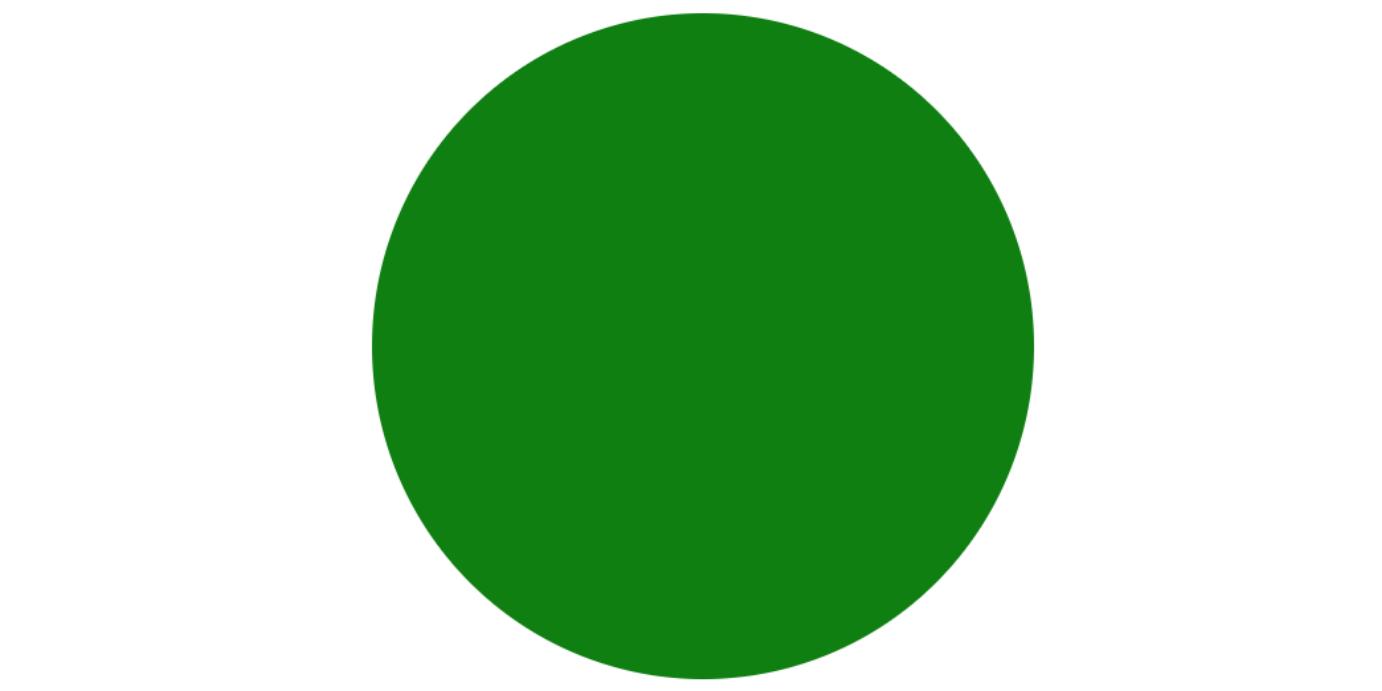
Rect

```
const defaultstyle = "fill:rgb(127,0,0)"

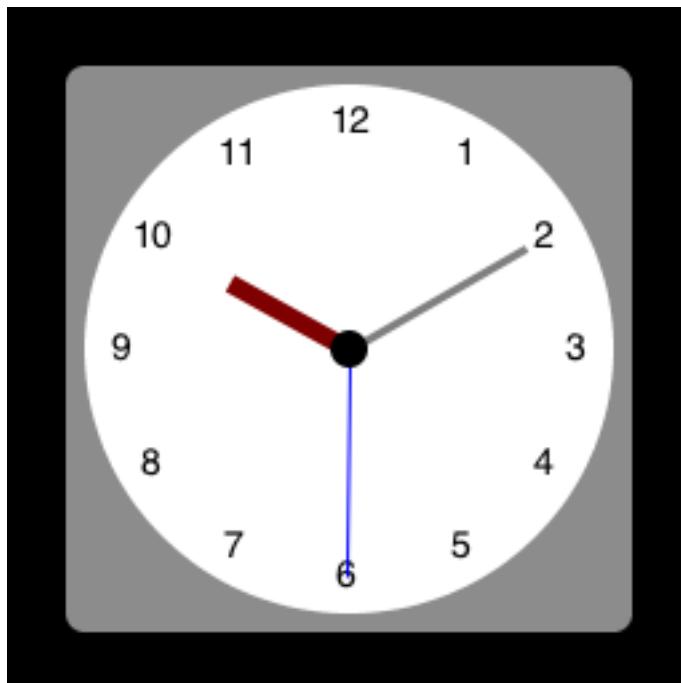
func circle(w http.ResponseWriter, req *http.Request) {
    w.Header().Set("Content-Type", "image/svg+xml")
    s := svg.New(w)
    s.Start(500, 500)
    s.Title("Circle")
    s.Circle(250, 250, 125, shapestyle(req.URL.Path))
    s.End()
}
```



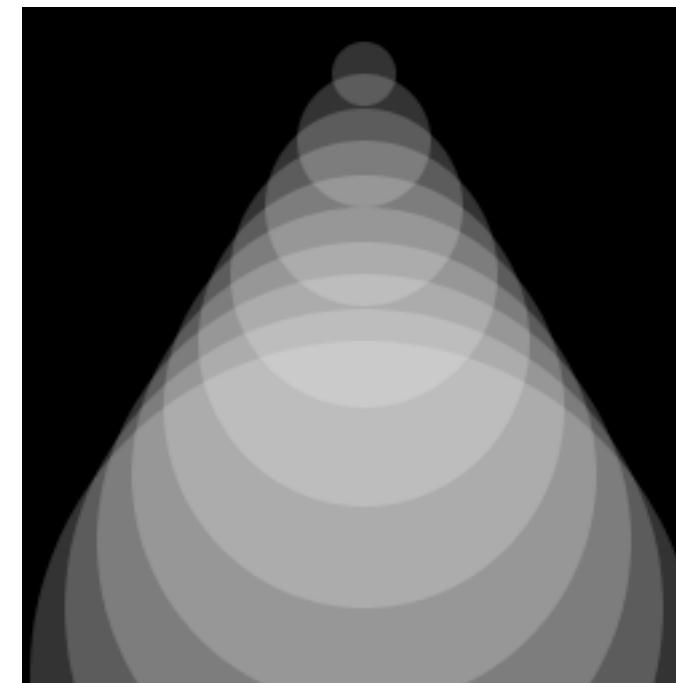
```
func shapestyle(path string) string {
    i := strings.LastIndex(path, "/") + 1
    if i > 0 && len(path[i:]) > 0 {
        return "fill:" + path[i:]
    }
    return defaultstyle
}
```



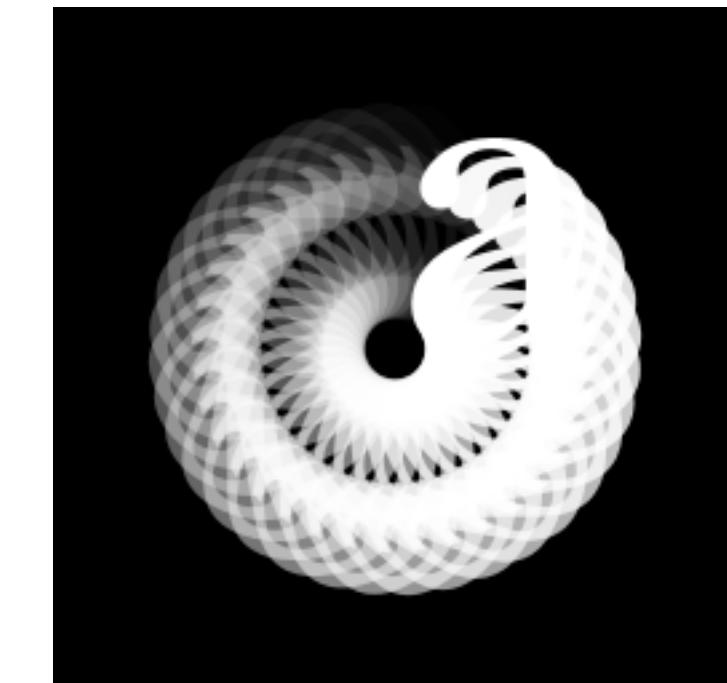
<https://ajstarks.org:1958/{thing}/>



clock



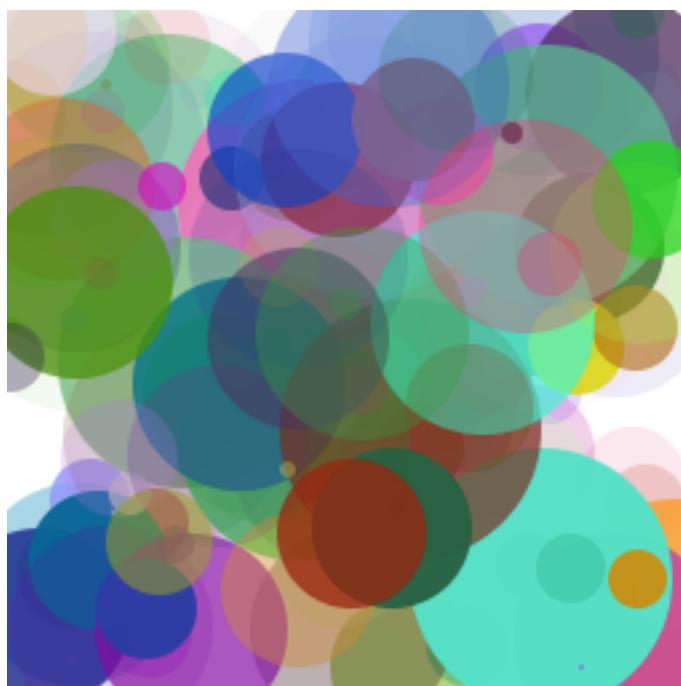
funnel



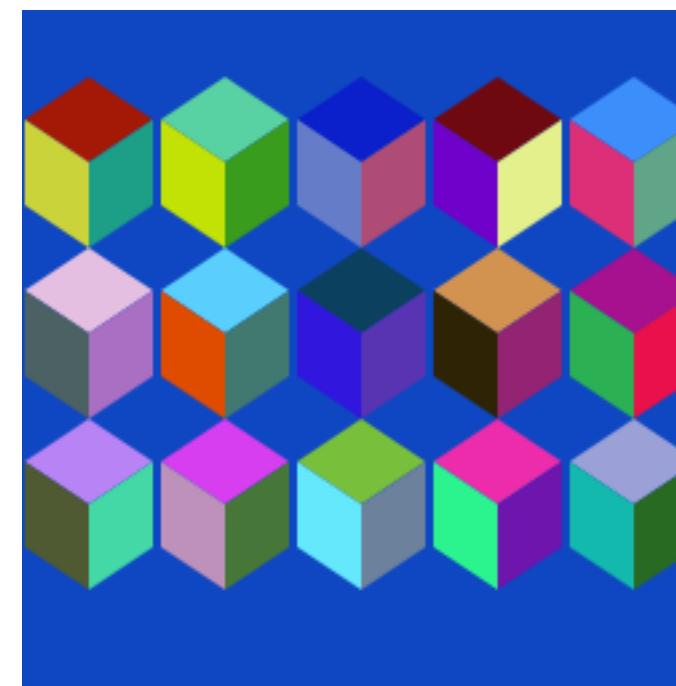
rotext



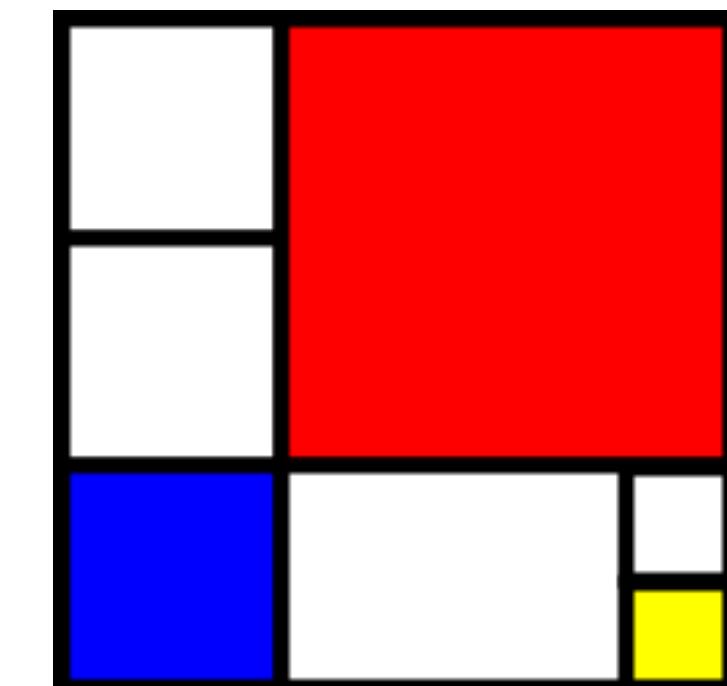
flower



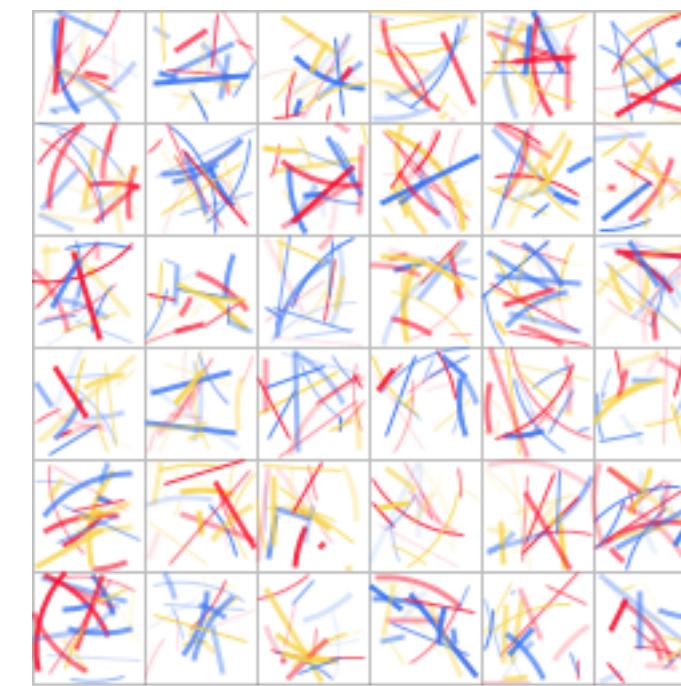
rshape



cube



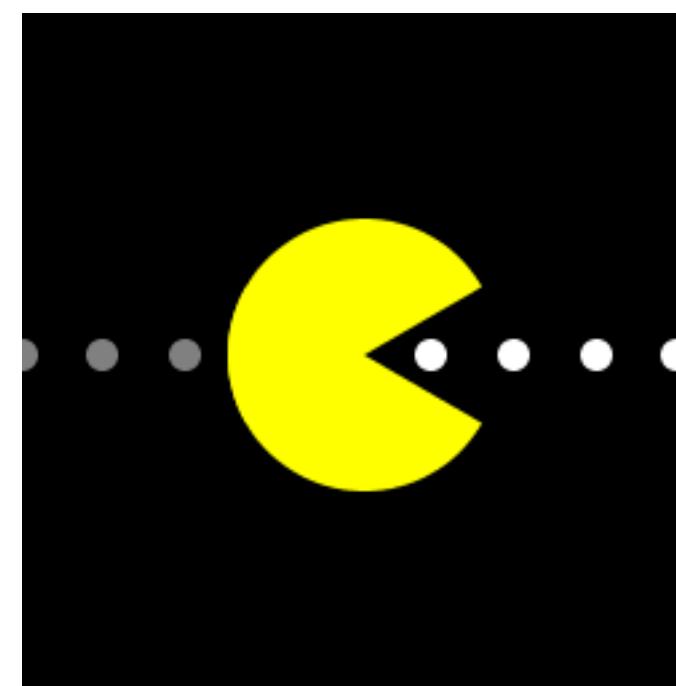
mondrian



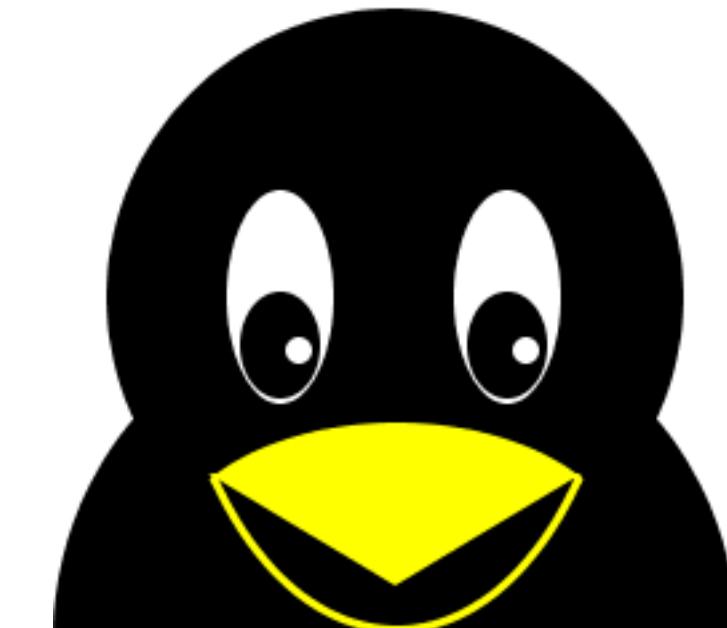
lewitt



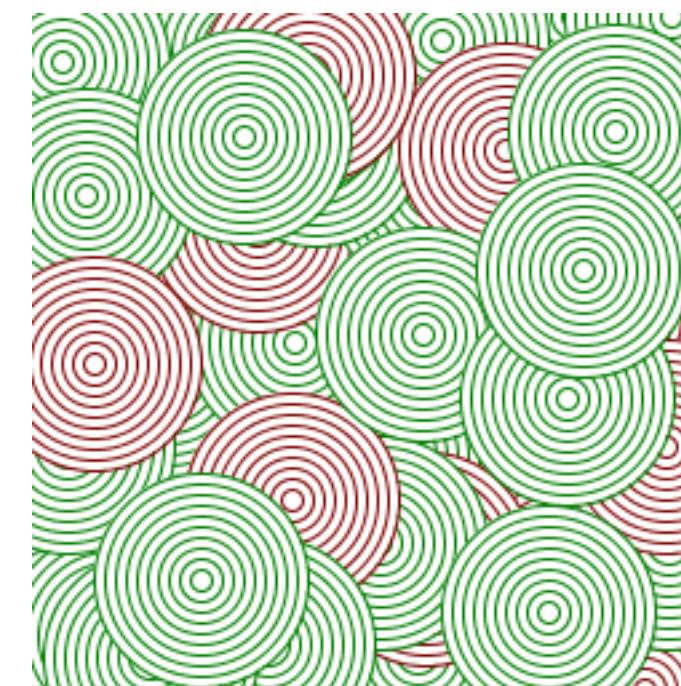
face



pacman



tux

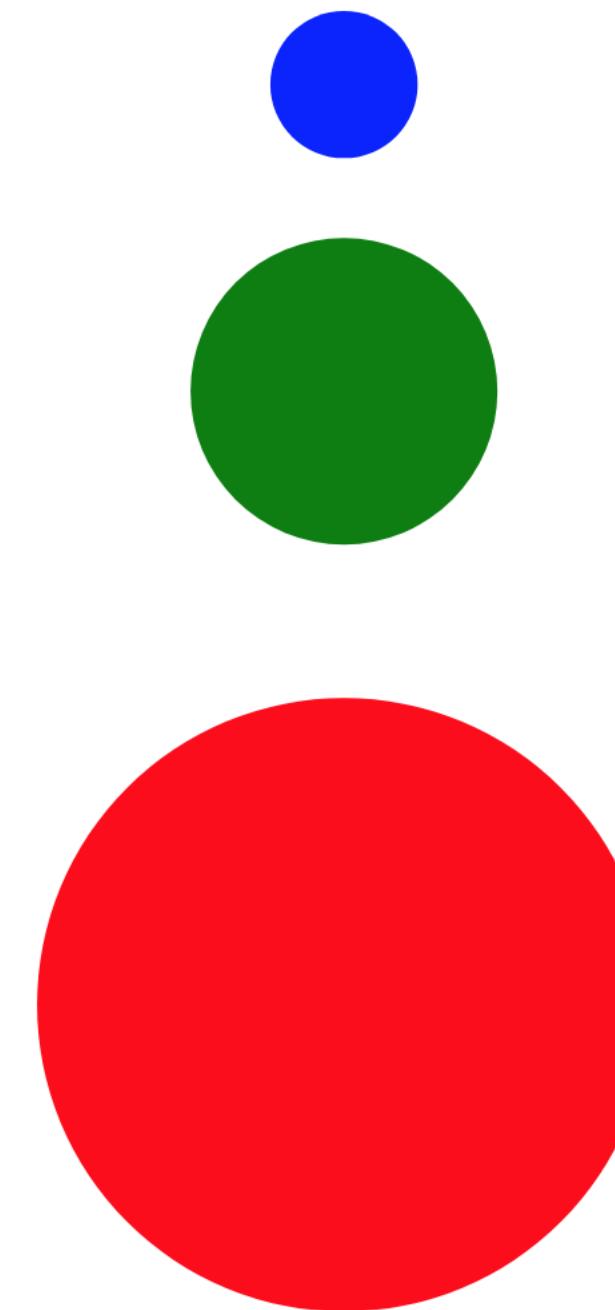


concentric

# Data

```
<thing top="100" left="100" sep="100">  
  <item width="50" height="50" name="Little" color="blue">This is small</item>  
  <item width="75" height="100" name="Med" color="green">This is medium</item>  
  <item width="100" height="200" name="Big" color="red">This is large</item>  
</thing>
```

# Picture



Little:This is small/blue

Med:This is medium/green

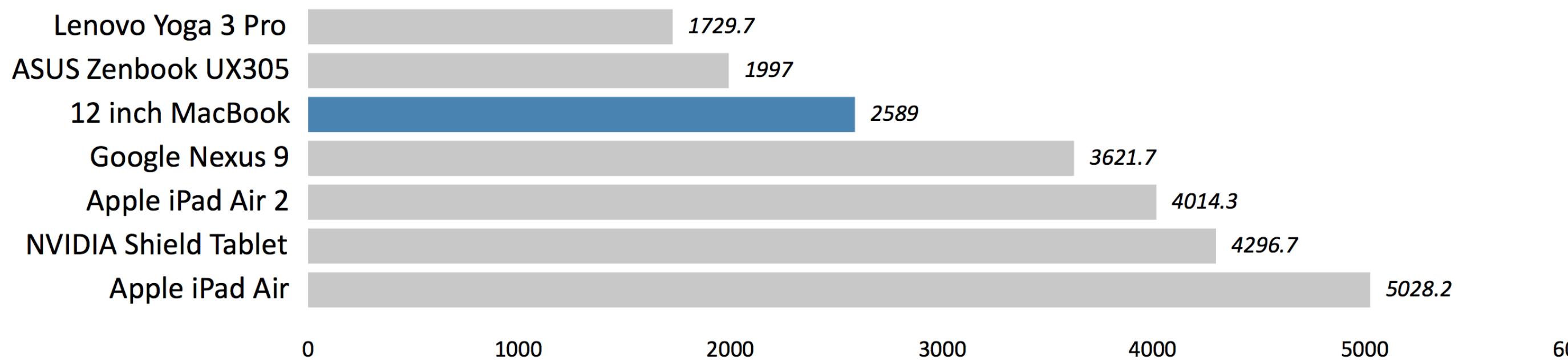
Big:This is large/red

```

<barchart title="2015 MacBook Benchmarks">
  <note>Source: AnandTech, April 14, 2015</note>
  <bdata scale="0,6000,1000"
    title="Mozilla Kraken 1.1 (native browser, milliseconds)">
    <bitem value="1729.7" name="Lenovo Yoga 3 Pro"/>
    <bitem value="1997.0" name="ASUS Zenbook UX305"/>
    <bitem color="steelblue" value="2589.0" name="12 inch MacBook"/>
    <bitem value="3621.7" name="Google Nexus 9"/>
    <bitem value="4014.3" name="Apple iPad Air 2"/>
    <bitem value="4296.7" name="NVIDIA Shield Tablet"/>
    <bitem value="5028.2" name="Apple iPad Air"/>
  </bdata>
</barchart>

```

*Mozilla Kraken 1.1 (native browser, milliseconds)*



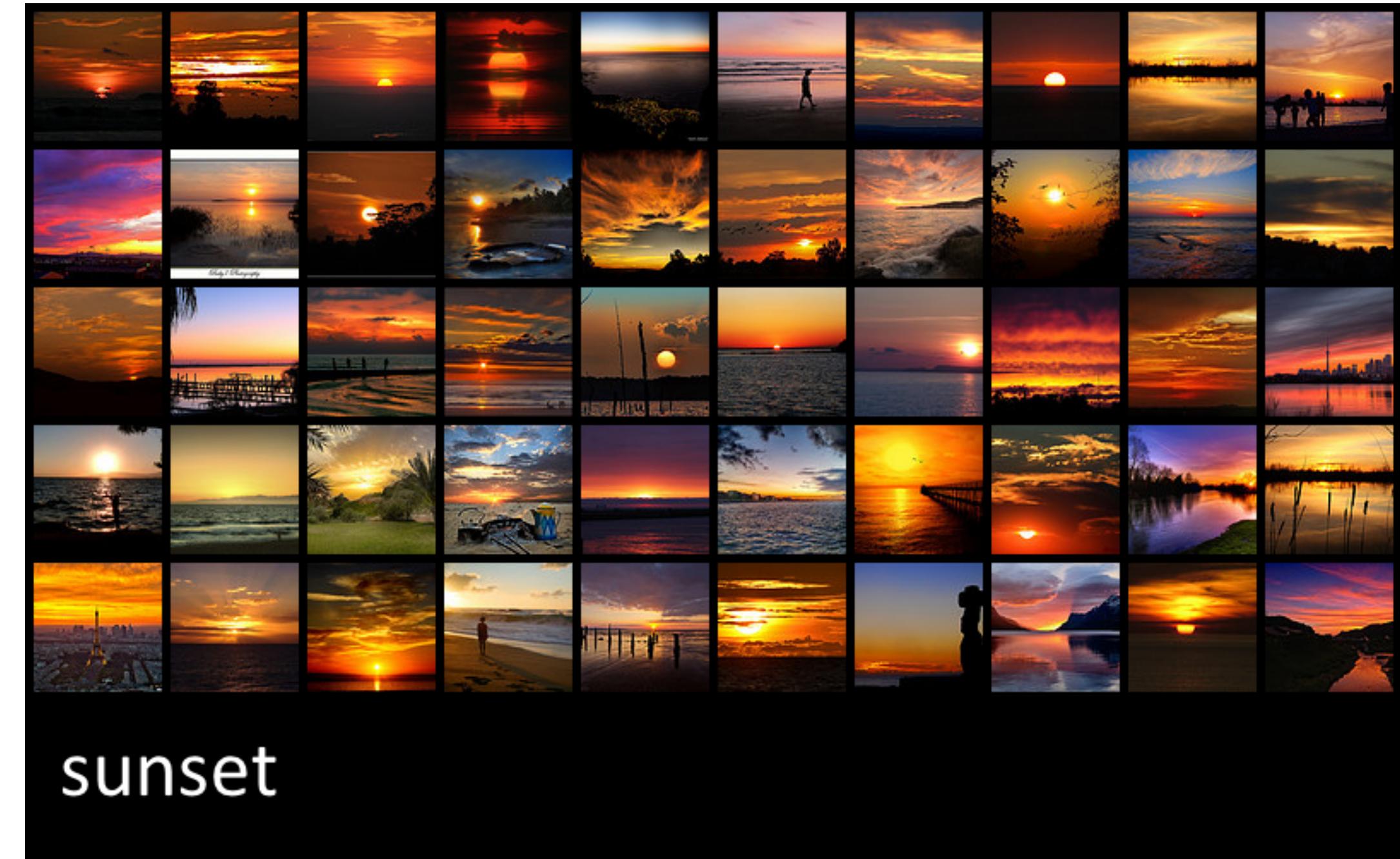
# 2015 MacBook Benchmarks

*Source: AnandTech, April 14, 2015*

# f50 sunset

```
https://api.flickr.com/services/rest/  
?method=flickr.photos.search  
&api_key=...  
&text=sunset  
&per_page=50  
&sort=interestingness-desc
```

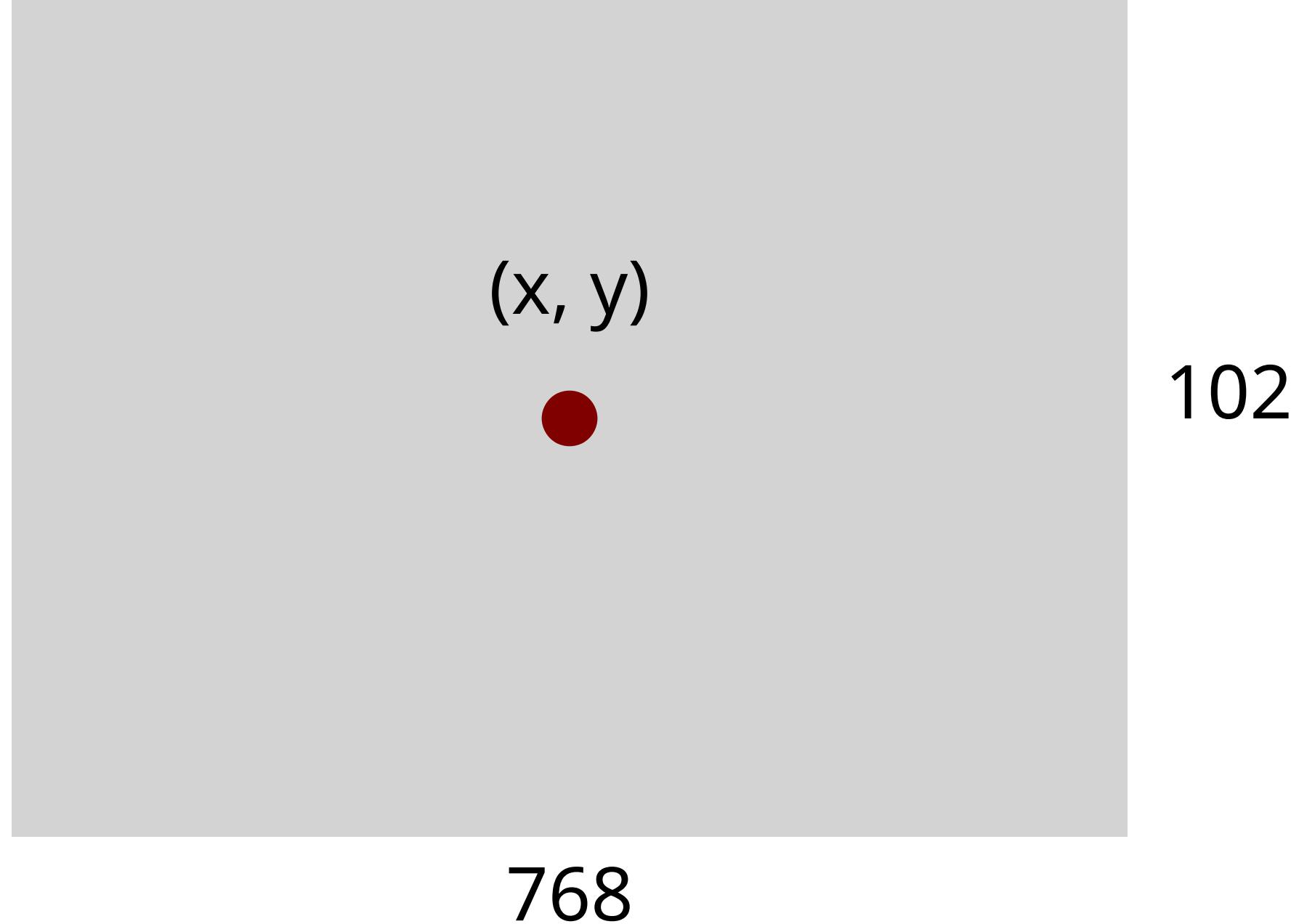
```
<?xml version="1.0" encoding="utf-8"?>  
<rsp stat="ok">  
  <photos page="1" pages="105615" perpage="50" total="5280747">  
    <photo id="4671838925" ... secret="b070f3363e" server="4068" farm="5" ... />  
    <photo id="3590142202" ... secret="c46752e4d8" server="2441" farm="3" ... />  
    ...  
  </photos>  
</rsp>
```



```
func vmap(value, low1, high1, low2, high2 float64) float64 {  
    return low2 + (high2-low2)*(value-low1)/(high1-low1)  
}
```

```
x := vmap(datax, 10, 20, 0, 767)  
y := vmap(datay, 0, 10000, 0, 1023)
```

datax = 15, datay = 5000

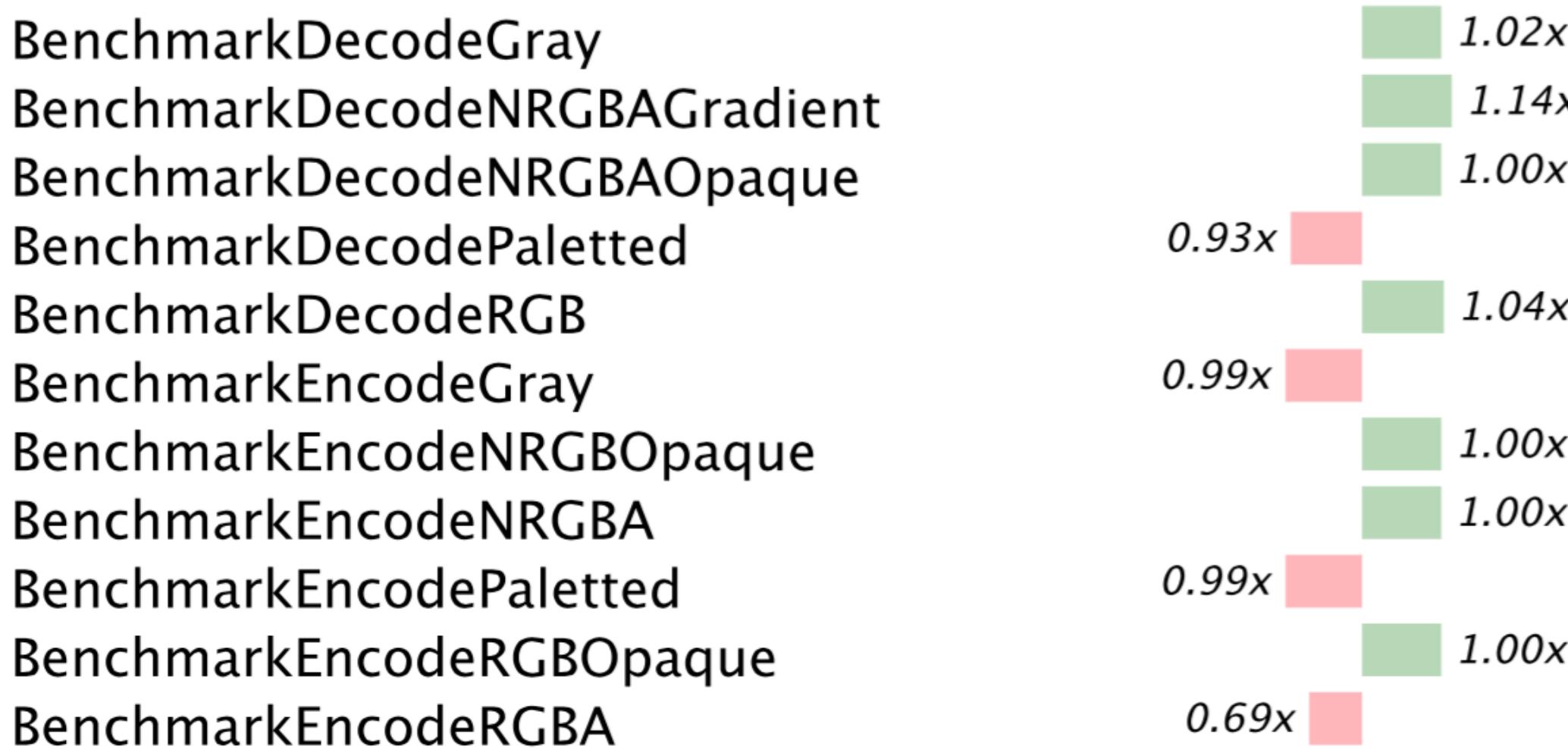
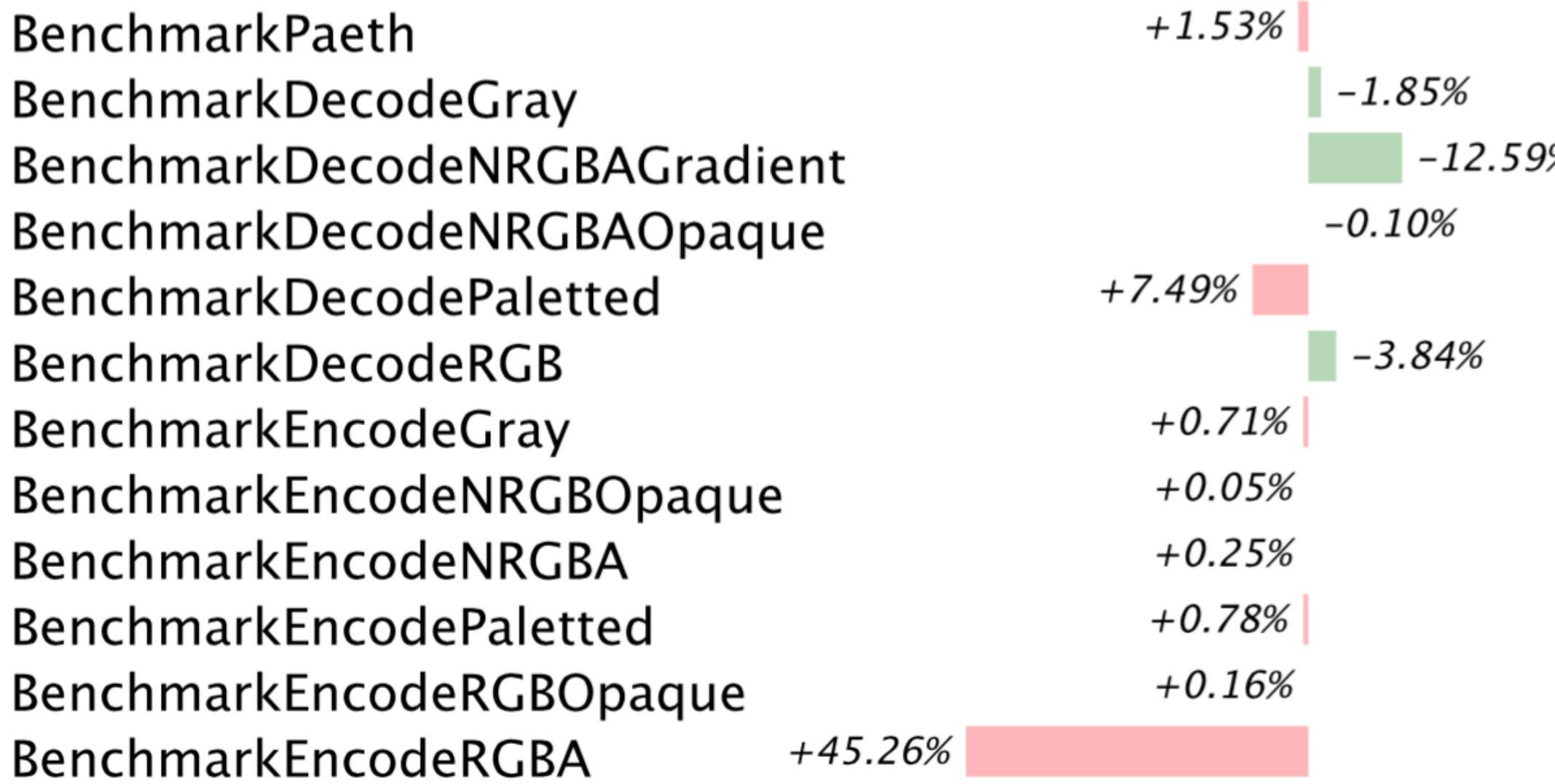


# SVGo Clients



# benchpng.txt

*image/png package: Go 1.3 vs Go 1.4*





```
structlayout -json bytes.Reader | structlayout-svg -t "bytes.Reader" > reader.svg
```

# Go Programming Language Release History

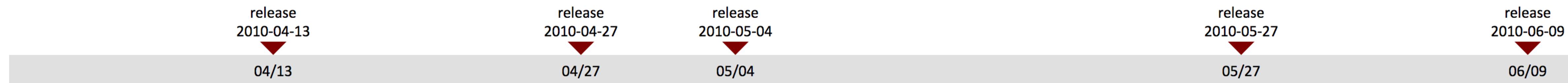
4Q 2009



1Q 2010



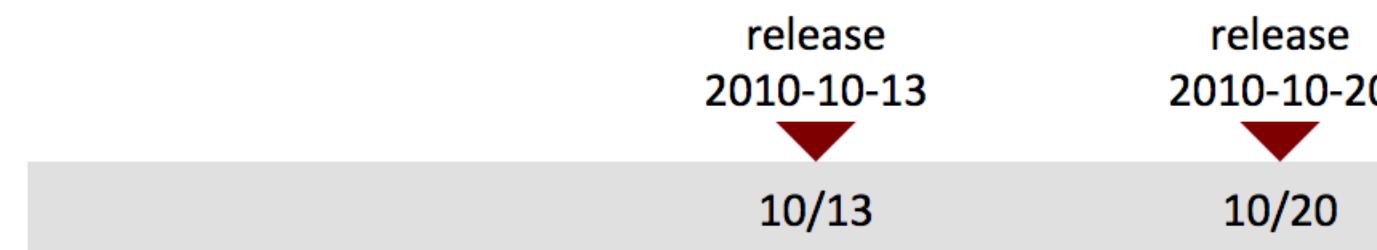
2Q 2010



3Q 2010



4Q 2010





## Sample Bullet Graph

The bullet graph features a single, primary measure (for example, current year-to-date revenue) compares that measure to one or more other measures to enrich its meaning, for example, compared to a target), and displays it in the context of qualitative ranges of performance, such as poor, satisfactory, and good.



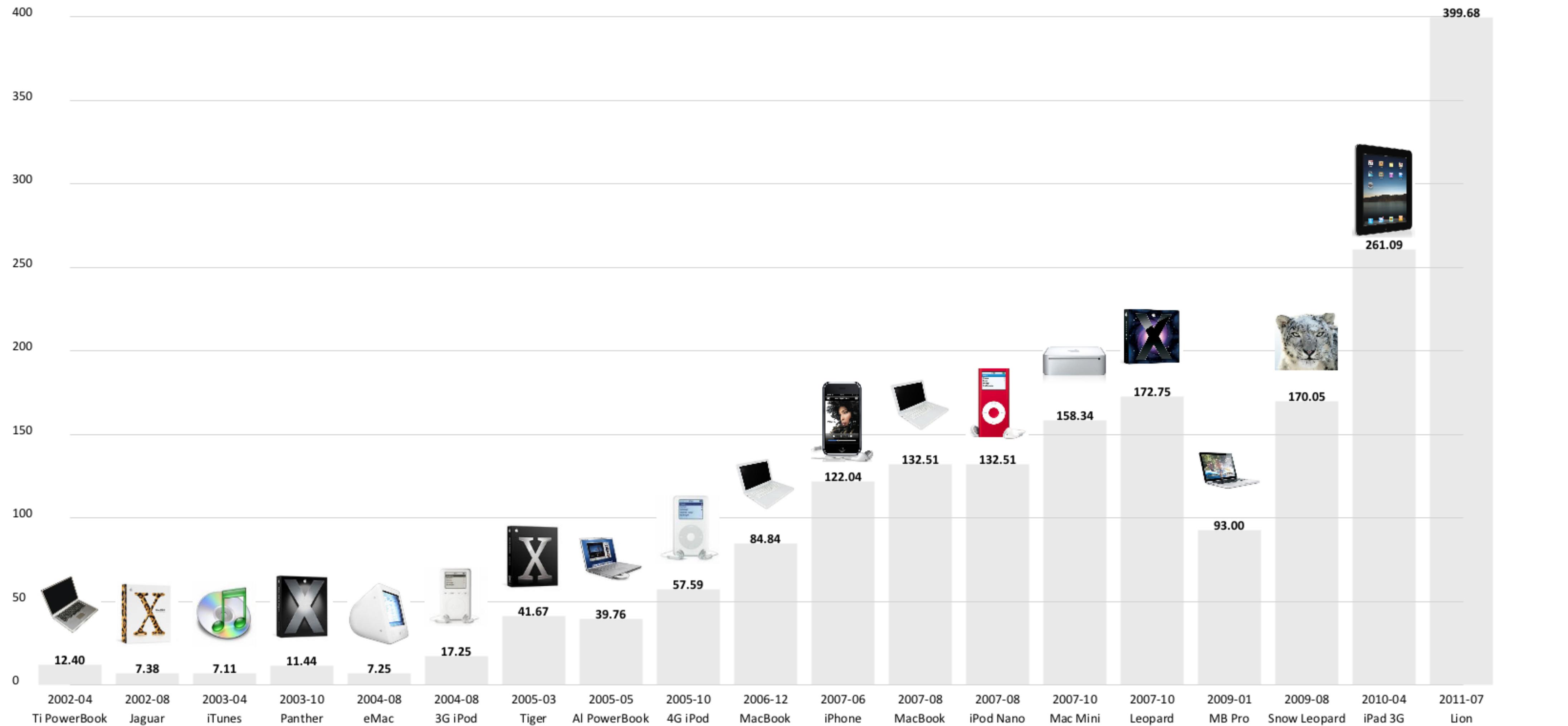
# PLANNING TO PLAN



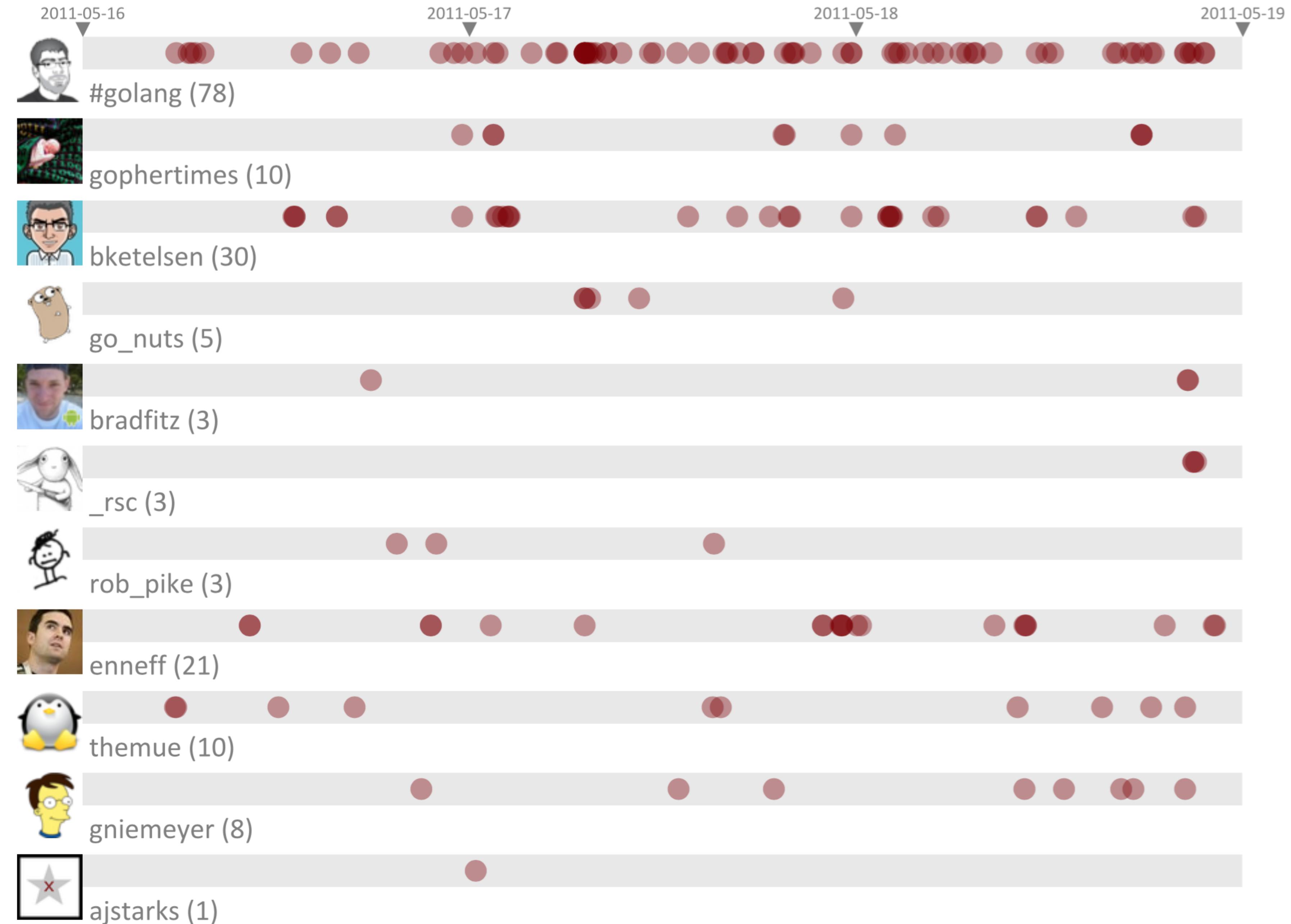




# Apple Purchases and Stock Price



# Twitter Update Frequency



You are here



# JONES

- LAYER TENNIS SEASON 4 WEEK 6 MATCH COMMENTARY BY MIKE MONTEIRO -

# MONTIEL



# DKNG

- LAYER TENNIS SEASON 4 WEEK 7 MATCH COMMENTARY BY JOHN GRUBER -

# DDL



# ANDERSON

- LAYER TENNIS SEASON 4 PLAYOFF QUARTERFINAL COMMENTARY BY BRYAN BEDELL -

# DKNG



CONTINO  
CASSARO



PUTNAM  
STOCKS



WHITE  
TAYLOR



HALL  
WARREN



STRAWBERRY LUNA  
DOUBLENAUT



JONES  
MONTIEL



DKNG  
DDL



SHAWNA X  
STEVENS



TAYLOR  
JONES



PUTNAM  
RAJKUMAR



REYES  
WHITE



ANDERSON  
DKNG



TAYLOR  
WHITE



RAJKUMAR  
ANDERSON



ANDERSON  
WHITE











```

// The carpet pattern from "The Shining"
package main

import (
    "fmt"
    "os"

    "github.com/ajstarks/svg"
)

func main() {
    xp := []int{50, 70, 70, 50, 30, 30} // x coords of the hexagon
    yp := []int{40, 50, 75, 85, 75, 50} // y coords of the hexagon
    xl := []int{0, 0, 50, 100, 100}      // x coords of the "house"
    yl := []int{100, 40, 10, 40, 100}    // y coords of the "house"

    stwidth := 12
    bgcolor := "rgb(227,78,25)" // background color
    bkcolor := "rgb(153,29,40)" // color of the hexagon
    stcolor := "rgb(65,52,44)" // color of the stripes
    stylefmt := "stroke:%s;stroke-width:%d;fill:%s"

    width, height := 800, 800
    canvas := svg.New(os.Stdout)
    canvas.Start(width, height)

    // Define the units of the pattern
    canvas.Def()
    canvas.Gid("unit") // a polygon, within a "house" shape
    canvas.Polyline(xl, yl, "fill:none")
    canvas.Polygon(xp, yp)
    canvas.Gend()

    canvas.Gid("runit") // rotate and translate the unit shape
    canvas.TranslateRotate(150, 180, 180)
    canvas.Use(0, 0, "#unit")
    canvas.Gend()
    canvas.Gend()
    canvas.DefEnd()

    // Loops to define the pattern
    canvas.Rect(0, 0, width, height, "fill:"+bgcolor)
    canvas.Gstyle(fmt.Sprintf(stylefmt, stcolor, stwidth, bkcolor))
    for y := 0; y < height; y += 130 { // vertical
        for x := -50; x < width; x += 100 { // horizontal
            canvas.Use(x, y, "#unit")
            canvas.Use(x, y, "#runit")
        }
    }
    canvas.Gend()
    canvas.End()
}

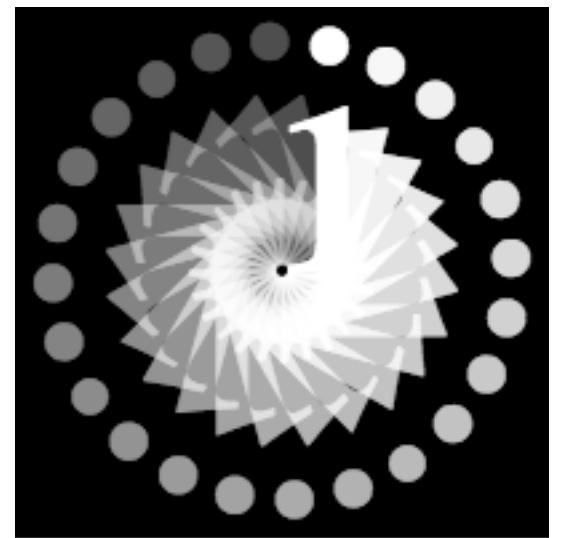
```



```
func main() {
```

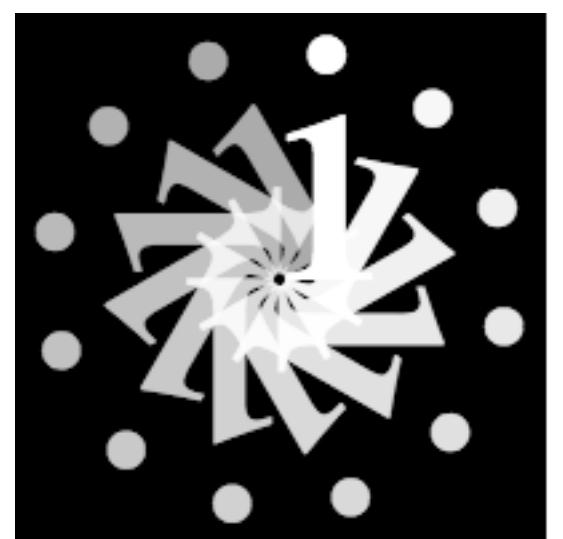
```
    width := 200  
    height := 200  
    a := 1.0  
    ai := 0.03  
    ti := 15.0
```

ti = 15



```
    canvas := svg.New(os.Stdout)  
    canvas.Start(width, height)  
    canvas.Rect(0, 0, width, height)  
    canvas.Gstyle("font-family:serif; font-size:100pt")
```

ti = 30

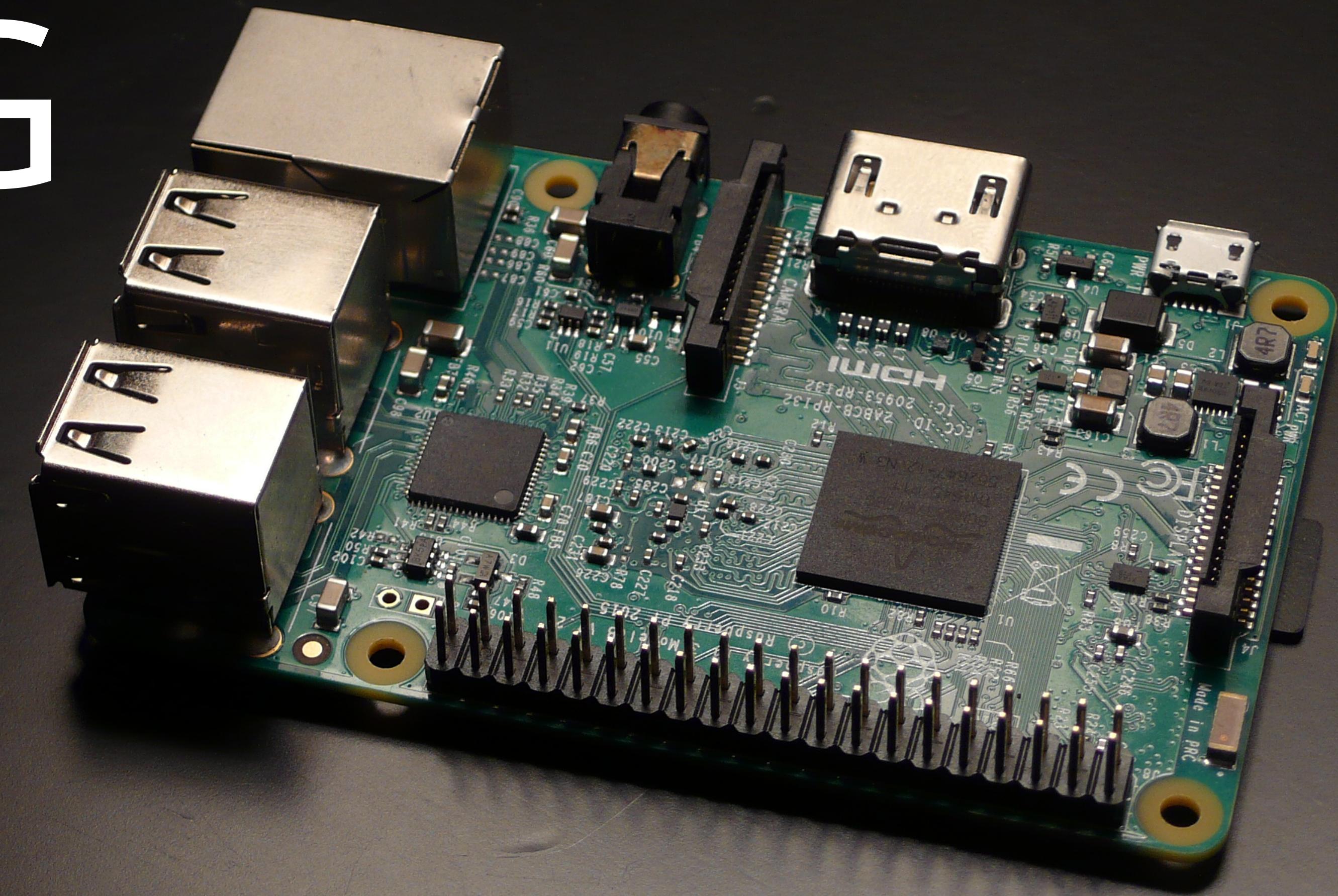


```
    for t := 0.0; t <= 360.0; t += ti {  
        canvas.TranslateRotate(width/2, height/2, t)  
        canvas.Text(0, 0, "i", canvas.RGBA(255, 255, 255, a))  
        canvas.Gend()  
        a -= ai  
    }  
    canvas.Gend()  
    canvas.End()
```

ti = 45

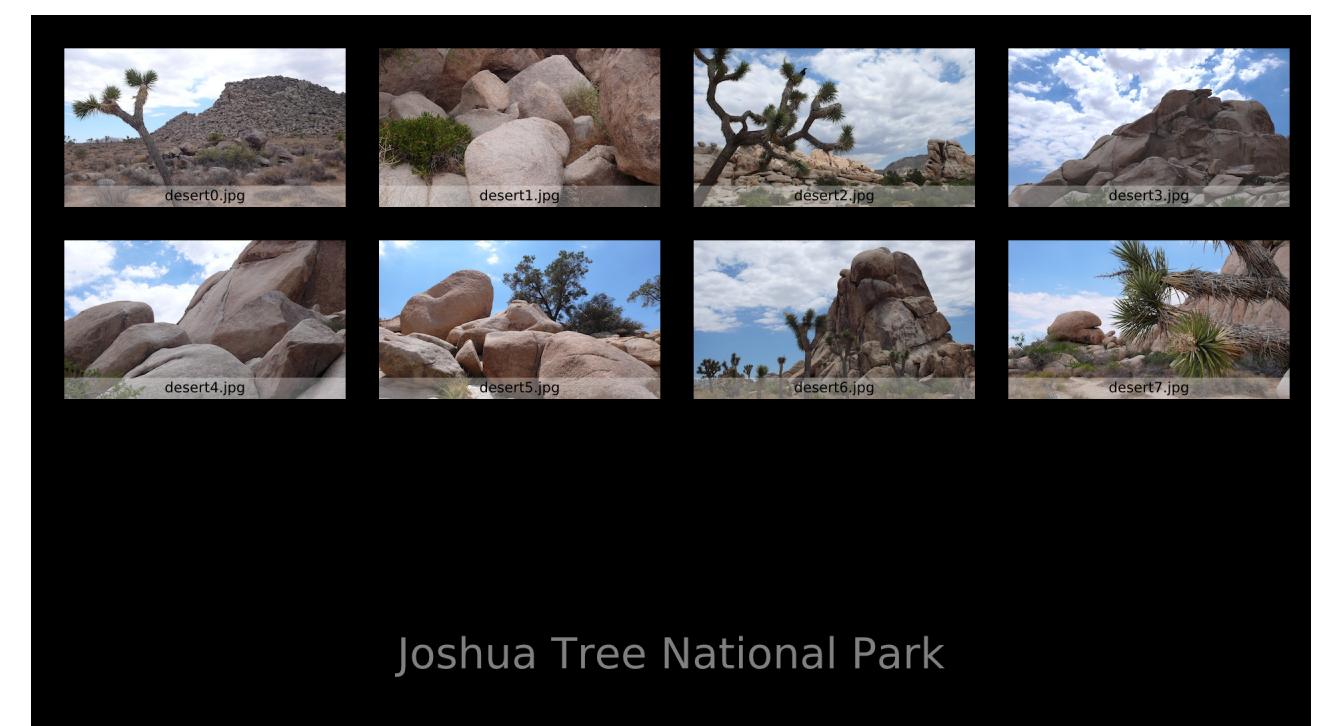
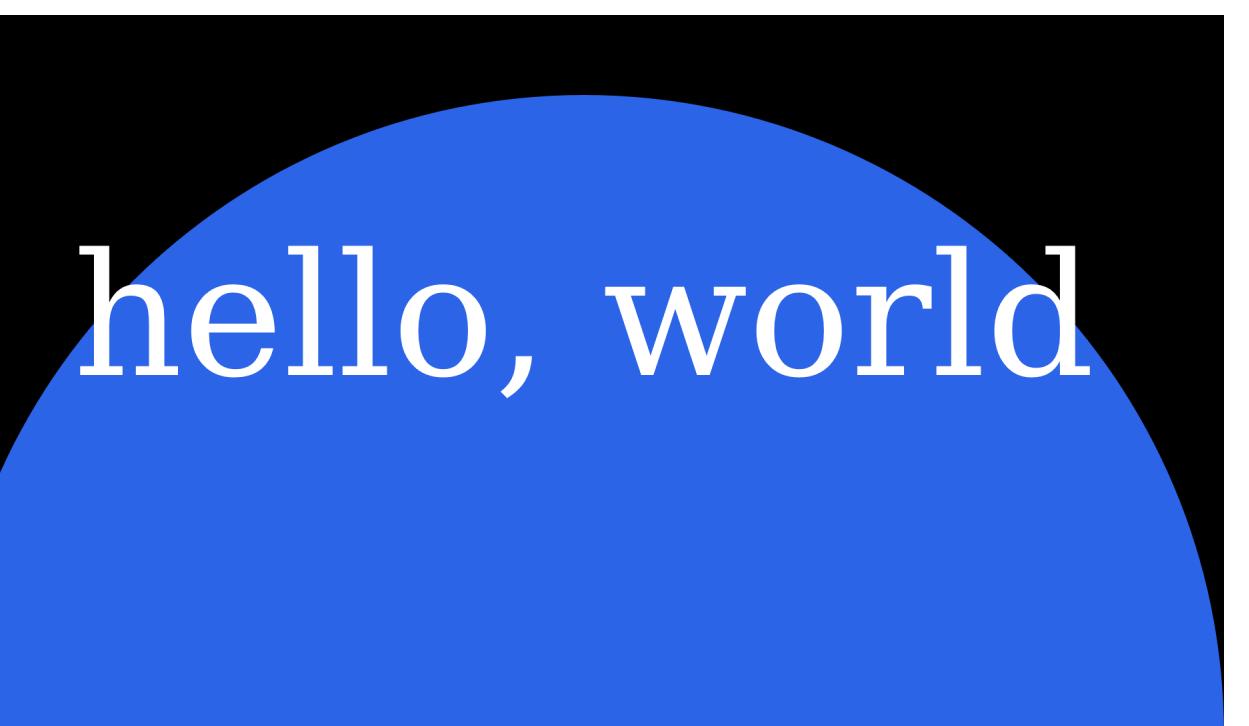
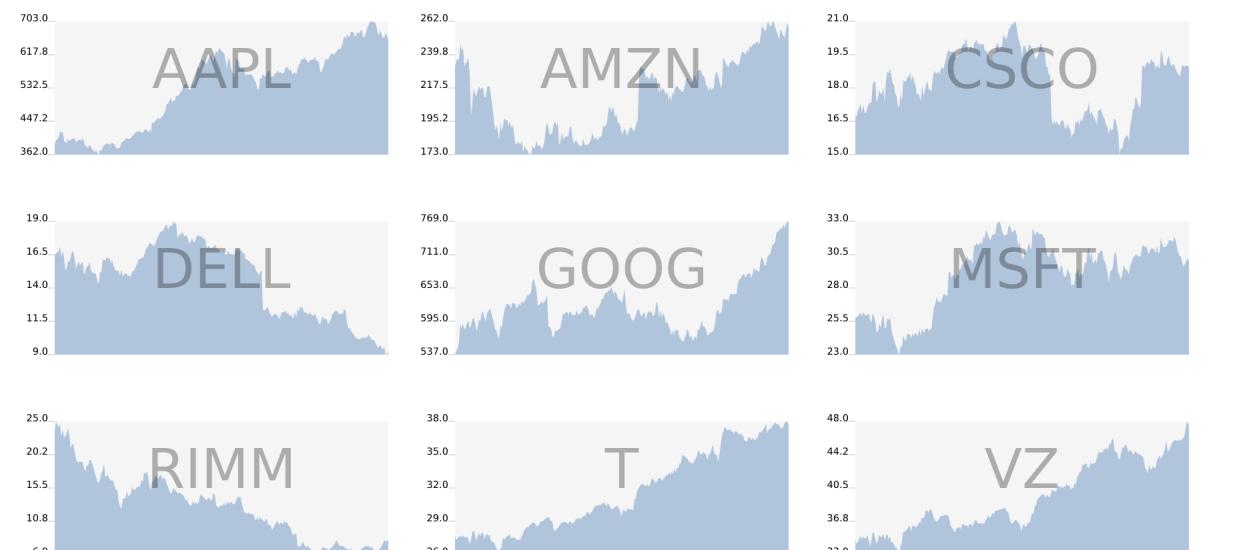
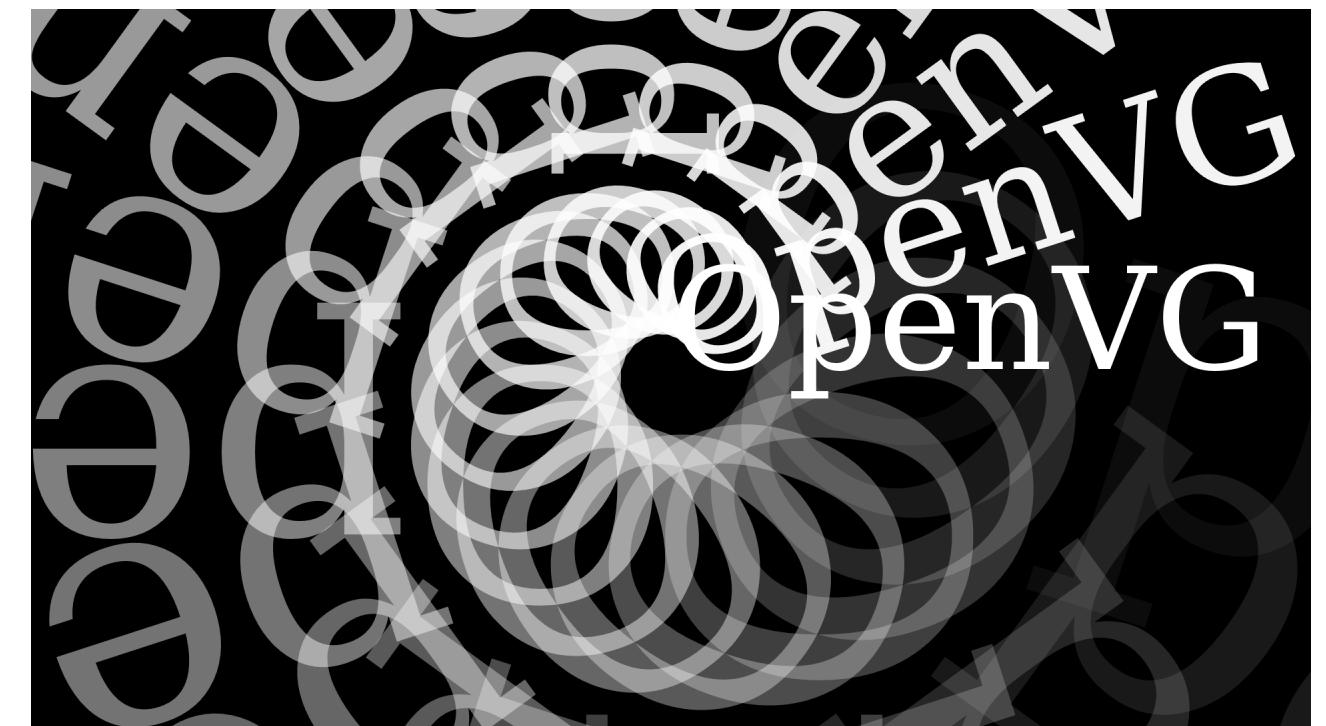
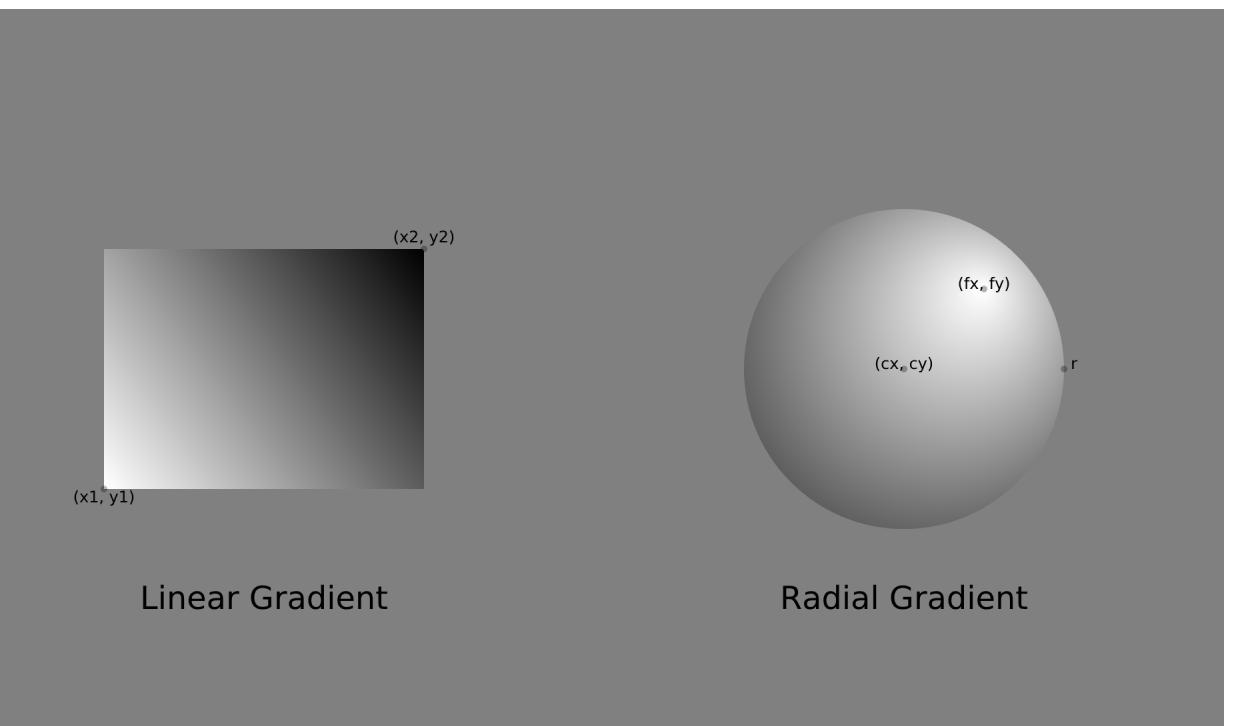


# OpenVG





## OpenVG on the Raspberry Pi

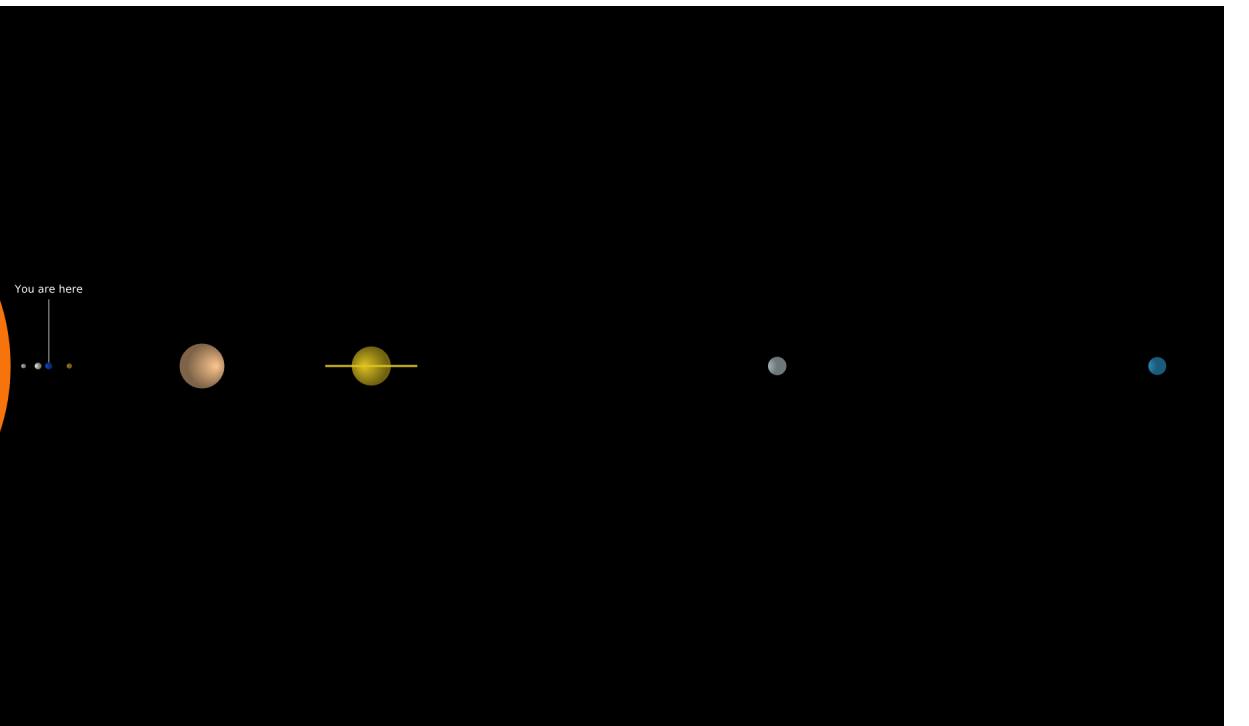


## Why I use Go



Anthony Starks

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ajstarks@gmail.com



```
package main
import "fmt"

func main() {
    fmt.Println("hello, world")
}
```

This is the traditional hello, world program.  
It's six lines long, and imports the `fmt` package,  
leading some to be surprised at the size of the resulting binary.

```
package main

import (
    "bufio"
    "github.com/ajstarks/openvg"
    "os"
)

func main() {
    width, height := openvg.Init()

    w2 := openvg.VGfloat(width / 2)
    h2 := openvg.VGfloat(height / 2)
    w := openvg.VGfloat(width)

    openvg.Start(width, height)                      // Start the picture
    openvg.BackgroundColor("black")                  // Black background
    openvg.FillRGB(44, 100, 232, 1)                // Big blue marble
    openvg.Circle(w2, 0, w)                         // The "world"
    openvg.FillColor("white")                       // White text
    openvg.TextMid(w2, h2, "hello, world", "serif", width/10) // Greetings
    openvg.End()                                    // End the picture
    bufio.NewReader(os.Stdin).ReadBytes('\n') // Pause until [RETURN]
    openvg.Finish()                                // Graphics cleanup
}
```



# OpenVG Functions

**Circle** (x, y, r VGfloat)

**Ellipse** (x, y, w, h VGfloat)

**Rect** (x, y, w, h VGfloat)

**Roundrect**(x, y, w, h, rw, rh VGfloat) **Image** (x, y VGfloat, w, h int, s string)

**Line** (x1, y1, x2, y2 VGfloat)

**Polyline** (x, y []VGfloat)

**Polygon** (x, y []VGfloat)

**Arc** (x, y, w, h, sa, aext VGfloat)

**Qbezier** (sx, sy, cx, cy, ex, ey VGfloat)

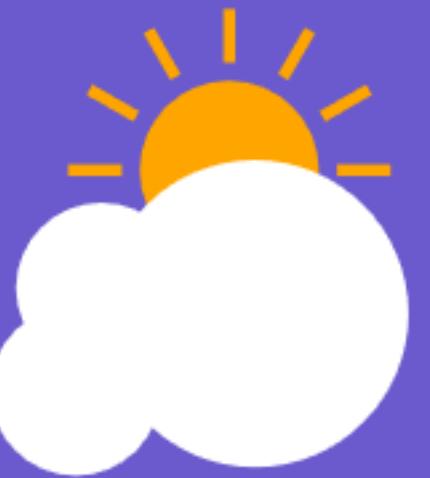
**Cbezier** (sx, sy, cx, cy, px, py, ex, ey VGfloat)

**Text** (x, y VGfloat, s, font string, size int)

**TextMid** (x, y VGfloat, s, font string, size int)

**TextEnd** (x, y VGfloat, s, font string, size int)

Mostly Cloudy

51° 

Thursday April 20

8:16 am

Group Therapy and Chastened Lawmakers at Raucous Town Halls

Bold, Unpredictable Foreign Policy Lifts Trump, but Has Risks

Mississippi District Ordered to Desegregate Its Schools

Mitch McConnell and Paul Ryan Are of Two Minds About Divided Government

Trump Adviser's Visit to Moscow Got the F.B.I.'s Attention



Mostly Cloudy

47°

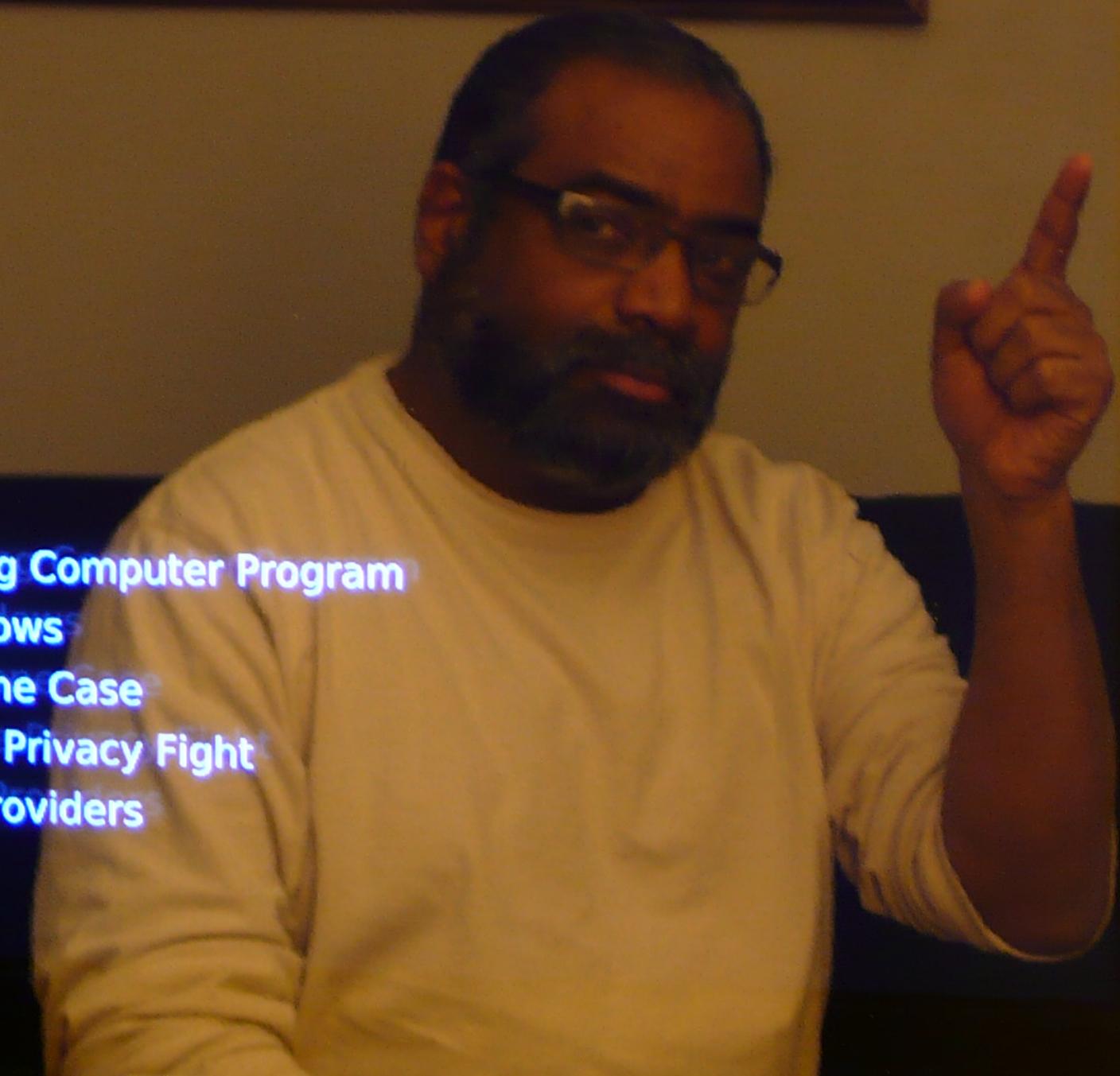


(feels like 45°)

Sunday March 13

3:03 am

Farhad and Mike Discuss the Apple Case and a Go-Playing Computer Program  
Getting the Weather Report From Windows  
The Government Answers Apple in the iPhone Case  
Apple and U.S. Bitterly Turn Up Volume in iPhone Privacy Fight  
F.C.C. Proposes Privacy Rules for Internet Providers



MECHANICAL DRAWING

GEOMETRICAL DRAWING

Mostly Cloudy

36° 

(feels like 29°)

29% Chance of precipitation

Tuesday February 23

9:41 pm

Justice Alito Addresses Prospect of an 8-Member Court

Michigan: State Senate Approves Aid to Help Flint Residents Pay Water Bills

Told to 'Take the Gloves Off,' John Kasich Says the Race Is Out of His Hands

Utah: Polygamist Sect Leaders Are Arrested on Fraud Charges

North Carolina: State Lawmakers Target Restroom Anti-Bias Law in Charlotte



HDMI Pi

Clear

66°



Friday April 14

5:55 pm

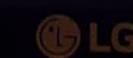
White House to Keep Its Visitor Logs Secret

Georgia Officers are Fired After Kicking Man at Traffic Stop

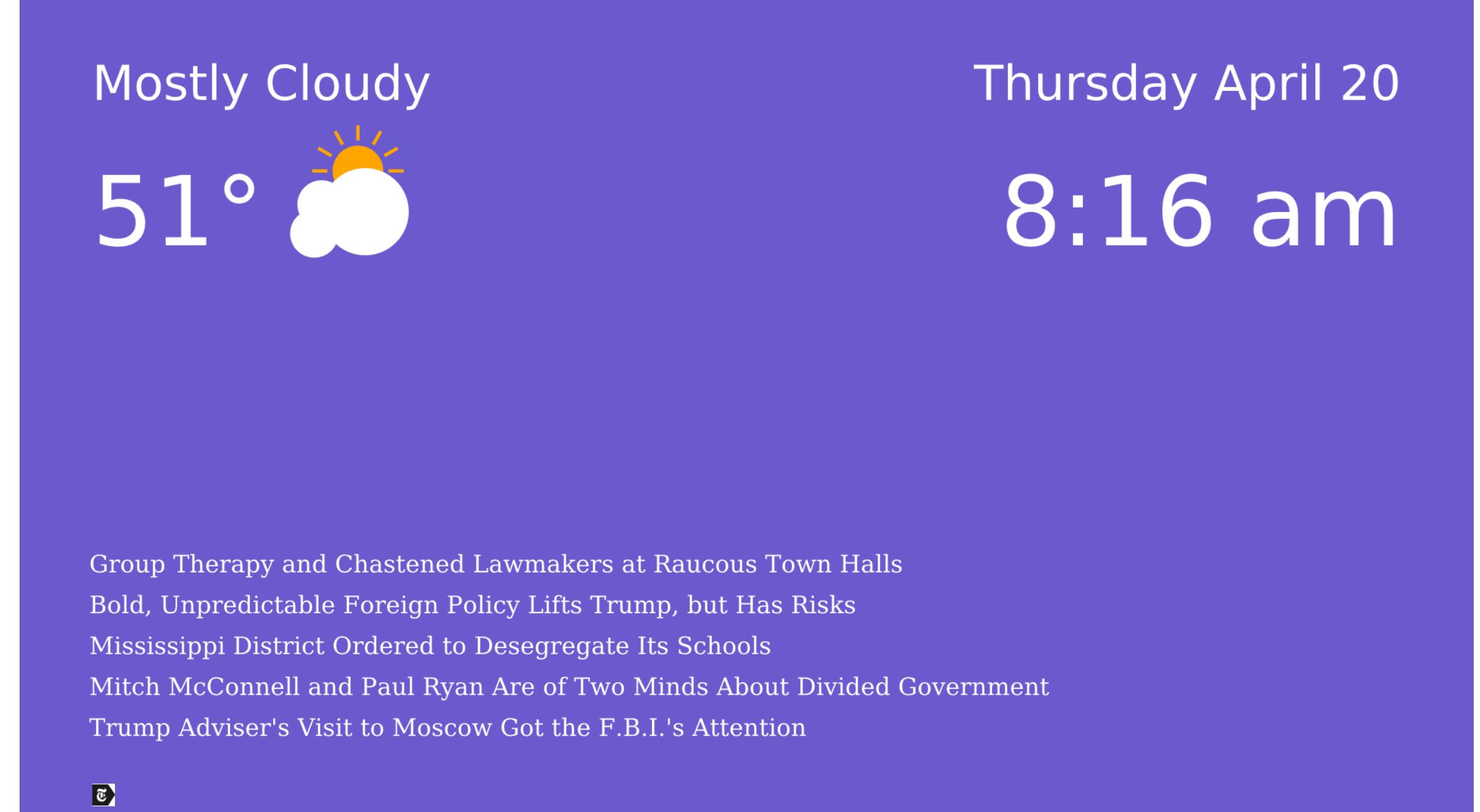
Does a Uniform Keep Officers in Line? The Baltimore Chief Thinks So

Wisconsin Man Who Mailed Manifesto to Trump Is Captured After 10-Day Manhunt

California Today: GoPros, Audiobooks and Other Perks of the Library



```
func main() {  
  
    //...  
  
    dateticker := time.NewTicker(1 * time.Minute)  
    weatherticker := time.NewTicker(5 * time.Minute)  
    headticker := time.NewTicker(10 * time.Minute)  
    sigint := make(chan os.Signal, 1)  
    signal.Notify(sigint, os.Interrupt)  
  
    for {  
        select {  
            case <-weatherticker.C:  
                canvas.weather(*location)  
            case <-dateticker.C:  
                canvas.clock(*smartcolor)  
            case <-headticker.C:  
                canvas.headlines(*section, *thumb)  
            case <-sigint:  
                openvg.Finish()  
                os.Exit(0)  
        }  
    }  
}
```



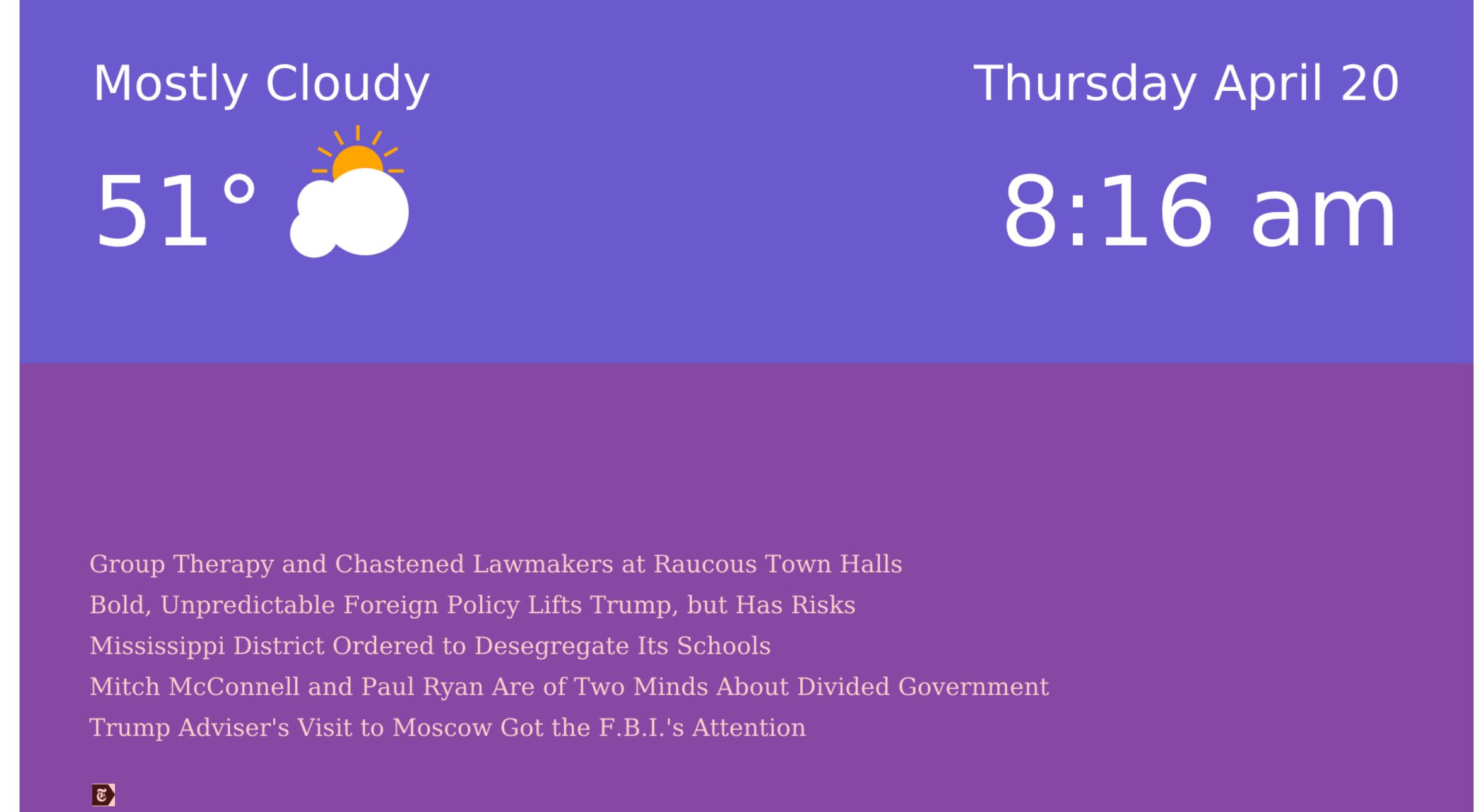
```
func main() {  
  
    //...  
  
    dateticker := time.NewTicker(1 * time.Minute)  
    weatherticker := time.NewTicker(5 * time.Minute)  
    headticker := time.NewTicker(10 * time.Minute)  
    sigint := make(chan os.Signal, 1)  
    signal.Notify(sigint, os.Interrupt)  
  
    for {  
        select {  
            case <-weatherticker.C:  
                canvas.weather(*location)  
            case <-dateticker.C:  
                canvas.clock(*smartcolor)  
            case <-headticker.C:  
                canvas.headlines(*section, *thumb)  
            case <-sigint:  
                openvg.Finish()  
                os.Exit(0)  
        }  
    }  
}
```



```
func main() {  
  
    //...  
  
    dateticker := time.NewTicker(1 * time.Minute)  
    weatherticker := time.NewTicker(5 * time.Minute)  
    headticker := time.NewTicker(10 * time.Minute)  
    sigint := make(chan os.Signal, 1)  
    signal.Notify(sigint, os.Interrupt)  
  
    for {  
        select {  
            case <-weatherticker.C:  
                canvas.weather(*location)  
            case <-dateticker.C:  
                canvas.clock(*smartcolor)  
            case <-headticker.C:  
                canvas.headlines(*section, *thumb)  
            case <-sigint:  
                openvg.Finish()  
                os.Exit(0)  
        }  
    }  
}
```



```
func main() {  
  
    //...  
  
    dateticker := time.NewTicker(1 * time.Minute)  
    weatherticker := time.NewTicker(5 * time.Minute)  
    headticker := time.NewTicker(10 * time.Minute)  
    sigint := make(chan os.Signal, 1)  
    signal.Notify(sigint, os.Interrupt)  
  
    for {  
        select {  
            case <-weatherticker.C:  
                canvas.weather(*location)  
            case <-dateticker.C:  
                canvas.clock(*smartcolor)  
            case <-headticker.C:  
                canvas.headlines(*section, *thumb)  
            case <-sigint:  
                openvg.Finish()  
                os.Exit(0)  
        }  
    }  
}
```



# deck



a Go package for presentations

```
Start the deck      <deck>

Set the canvas size <canvas width="1024" height="768" />

Begin a slide       <slide bg="white" fg="black">

Place an image      <image xp="70" yp="60" width="640" height="480" name="follow.png" sp="1" caption="Dreams"/>

Draw some text       <text xp="20" yp="80" sp="5" link="http://goo.gl/Wm05Ex">Deck elements</text>

Make a bullet list   <list xp="20" yp="70" sp="3" type="bullet">

                      <li>text, list, image</li>
                      <li>line, rect, ellipse</li>
                      <li>arc, curve, polygon</li>

End the list         </list>

Draw a line          <line xp1="20" yp1="10" xp2="30" yp2="10" />

Draw a rectangle     <rect xp="35" yp="10" wp="4" hr="75" color="rgb(127,0,0)" />

Draw an ellipse      <ellipse xp="45" yp="10" wp="4" hr="75" color="rgb(0,127,0)" />

Draw an arc          <arc xp="55" yp="10" wp="4" hp="3" a1="0" a2="180" color="rgb(0,0,127)" />

Draw a quadratic bezier <curve xp1="60" yp1="10" xp2="75" yp2="20" xp3="70" yp3="10" />

Draw a polygon        <polygon xc="75 75 80" yc="8 12 10" color="rgb(0,0,127)" />

End the slide        </slide>

End of the deck      </deck>
```

## Anatomy of a Deck

# Deck elements

- text, list, image
- line, rect, ellipse
- arc, curve, polygon



Dreams



**Percent Grid**

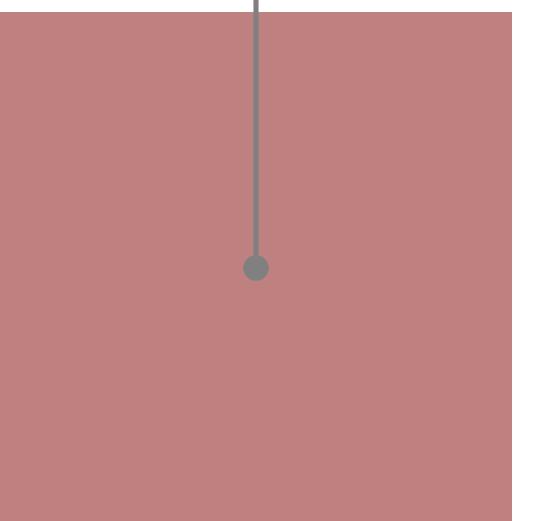
10%, 50%

Hello

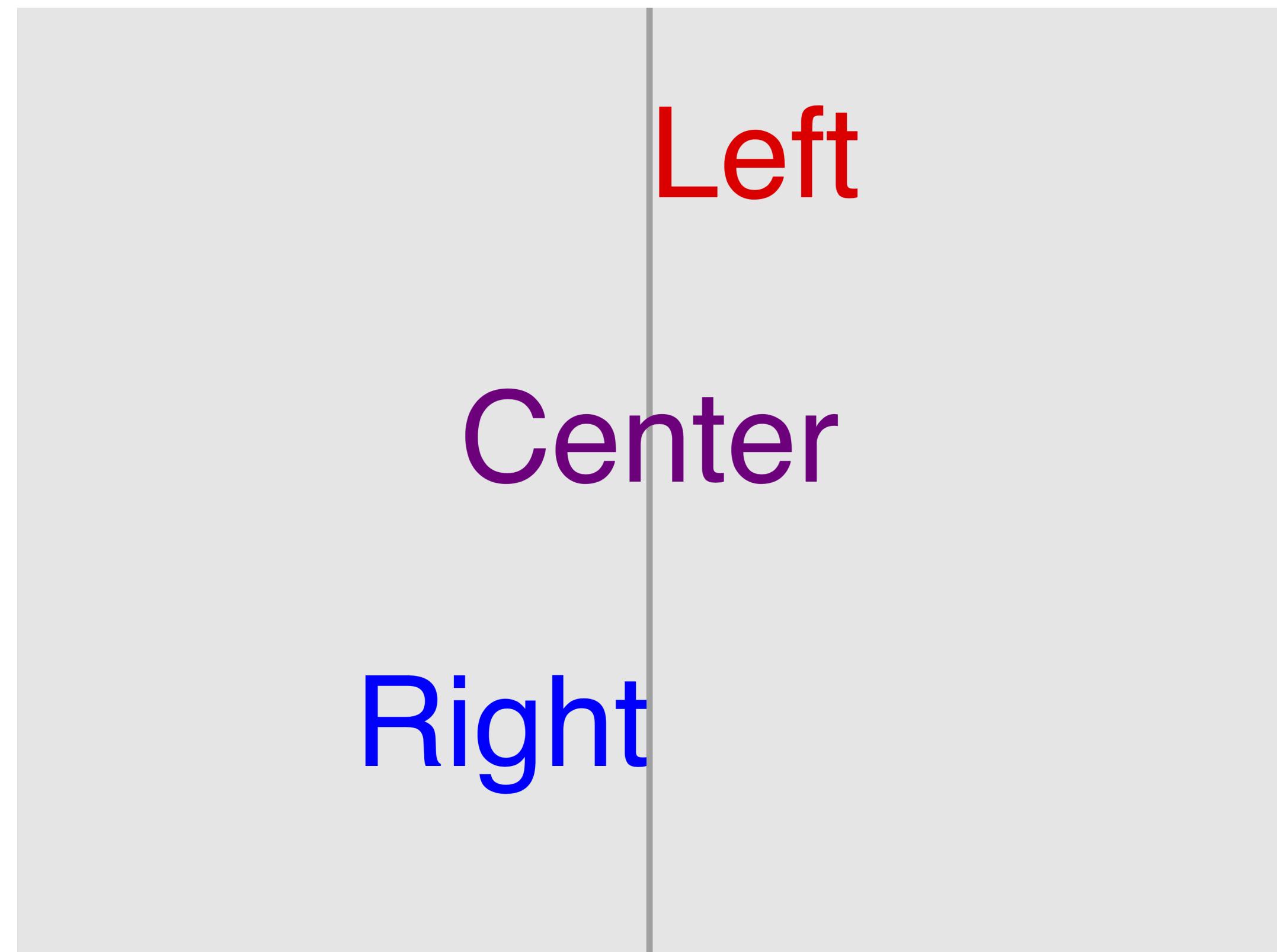
50%, 50%



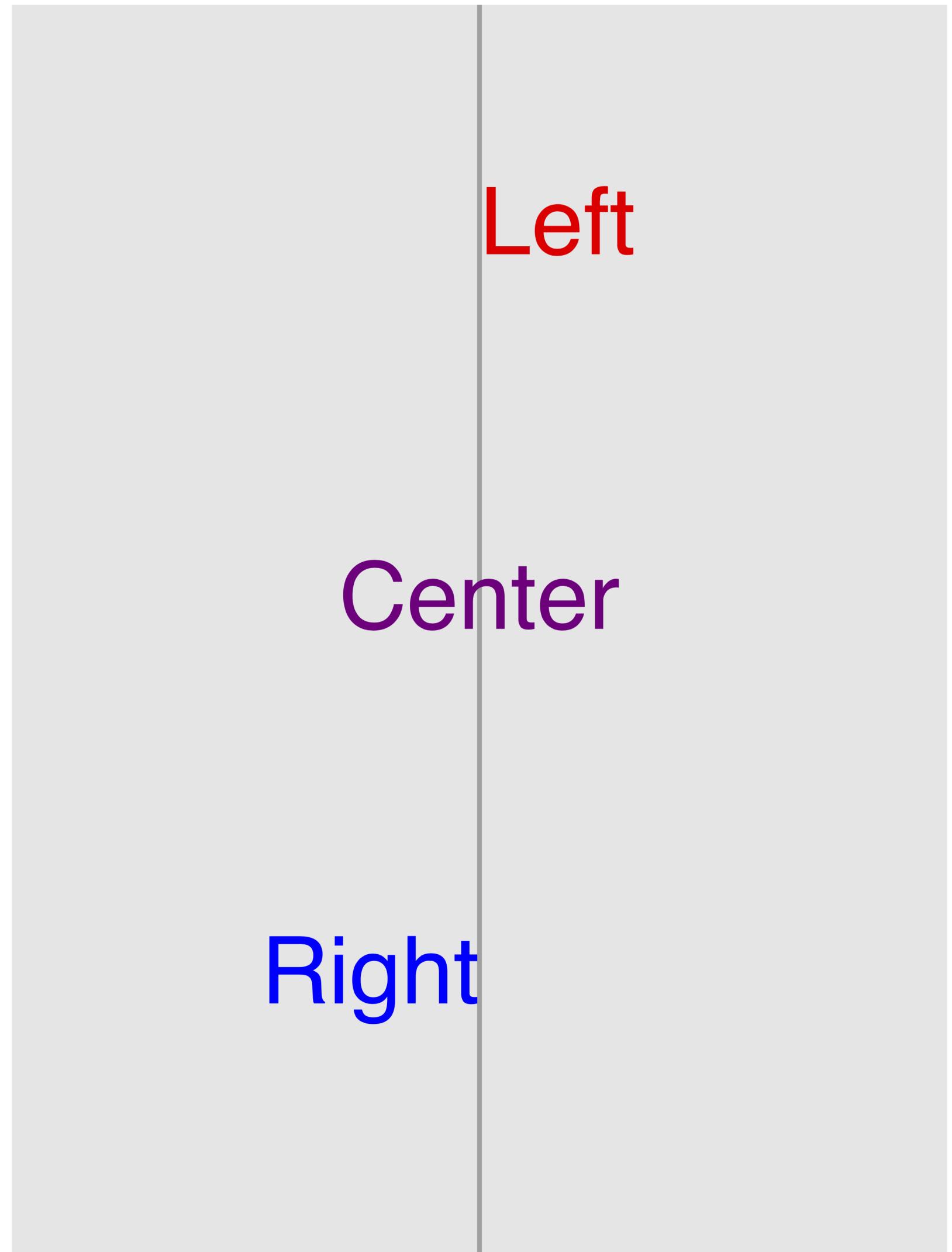
90%, 50%



Percentage-based layout



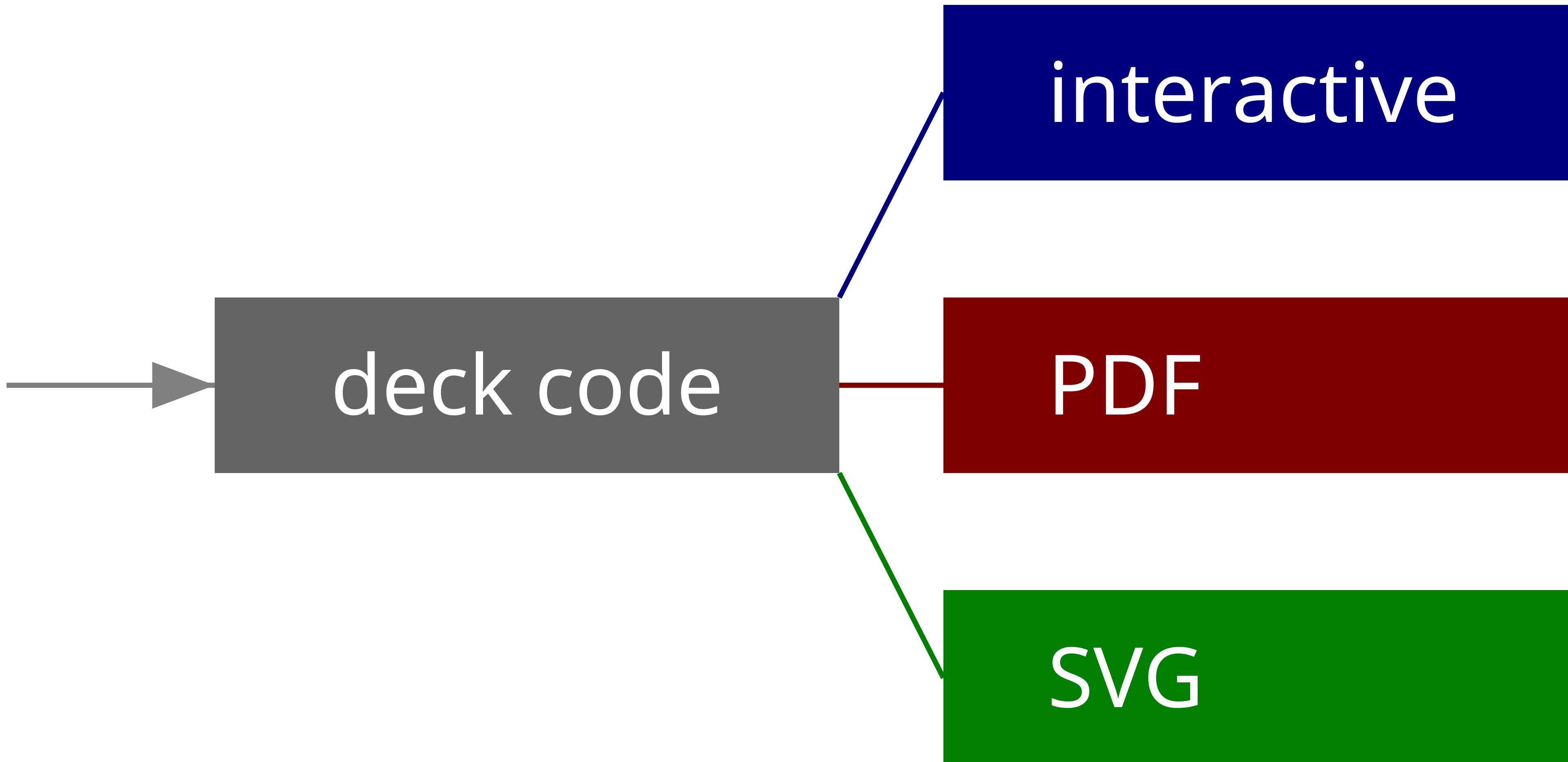
Landscape



Portrait

# Scaling the canvas

Process



# deck/generate text and list functions

**Text** (x, y float64, s, font string, size float64, color string, op ...float64)

**TextBlock**(x, y float64, s, font string, size, margin float64, color string, op ...float64)

**TextMid** (x, y float64, s, font string, size float64, color string, op ...float64)

**TextEnd** (x, y float64, s, font string, size float64, color string, op ...float64)

**Code** (x, y float64, s string, size, margin float64, color string, op ...float64)

**List** (x, y, size float64, items []string, ltype, font, color string)

# deck/generate graphic functions

**Image** (x, y float64, w, h int, name string)

**Arc** (x, y, w, h, size, a1, a2 float64, color string, op ...float64)

**Circle** (x, y, w float64, color string, op ...float64)

**Ellipse** (x, y, w, h float64, color string, op ...float64)

**Square** (x, y, w float64, color string, op ...float64)

**Rect** (x, y, w, h float64, color string, op ...float64)

**Curve** (x1, y1, x2, y2, x3, y3, size float64, color string, op ...float64)

**Line** (x1, y1, x2, y2, size float64, color string, op ...float64)

**Polygon** (x, y []float64, color string, op ...float64)

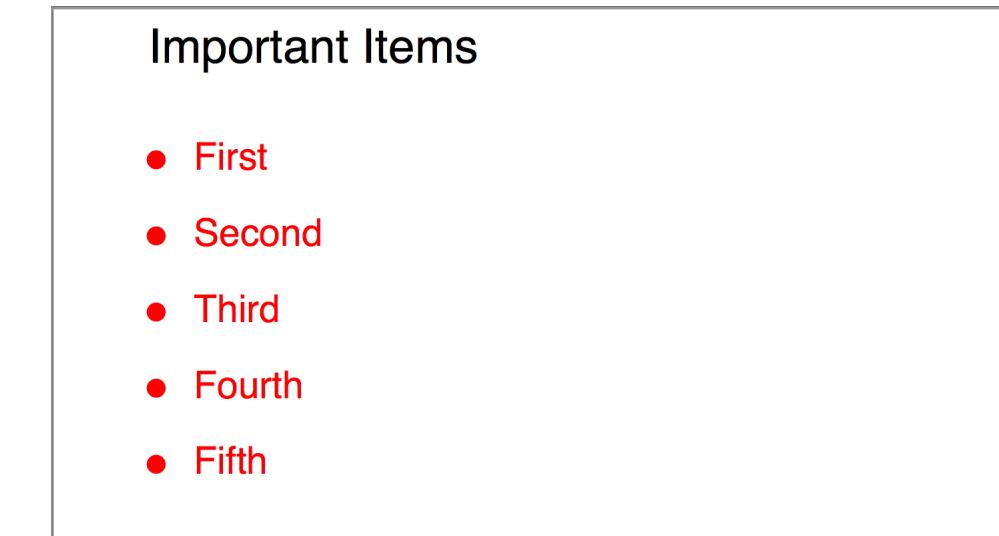
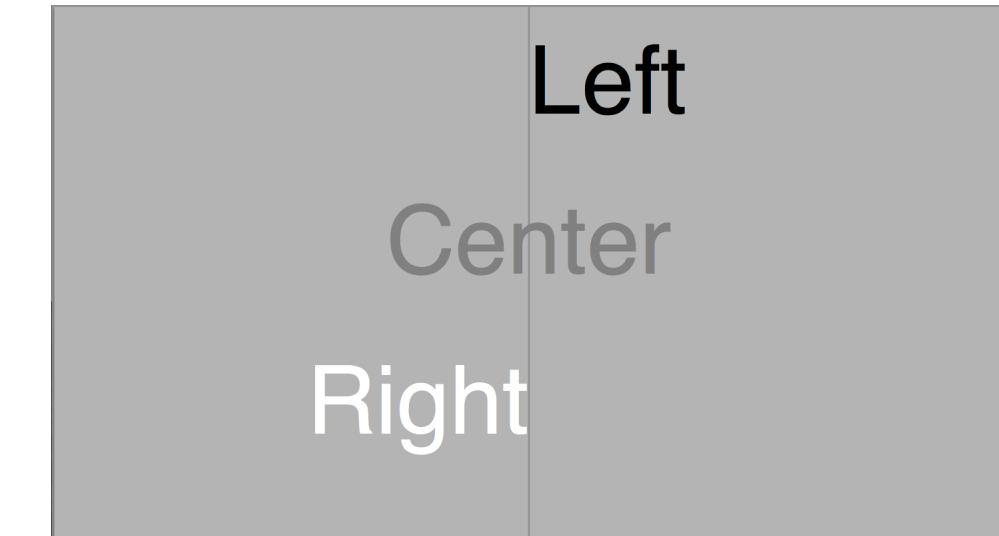
```
func main() {
    deck := generate.NewSlides(os.Stdout, 1600, 900) // 16x9 deck to stdout
    deck.StartDeck() // start the deck

    deck.StartSlide("rgb(180,180,180)")
    // ...
    deck.EndSlide()

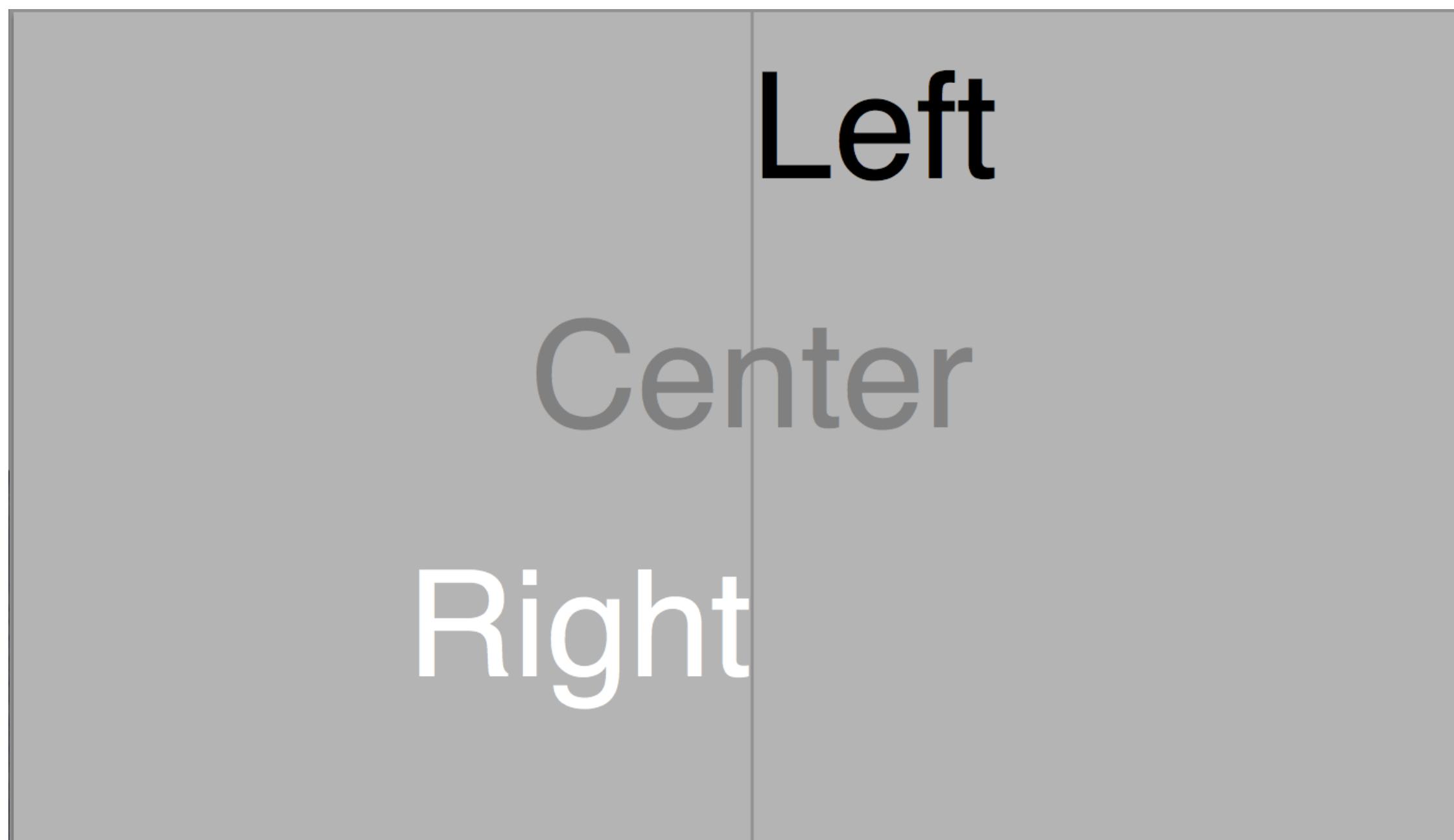
    deck.StartSlide()
    // ...
    deck.EndSlide()

    deck.StartSlide("black", "white")
    // ...
    deck.EndSlide()

    deck.EndDeck() // end the deck
}
```



```
// Text alignment
deck.StartSlide("rgb(180,180,180)")
deck.Text(50, 80, "Left", "sans", 10, "black")
deck.TextMid(50, 50, "Center", "sans", 10, "gray")
deck.TextEnd(50, 20, "Right", "sans", 10, "white")
deck.Line(50, 100, 50, 0, 0.2, "black", 20)
deck.EndSlide()
```



```
// List
items := []string{"First", "Second", "Third",
                    "Fourth", "Fifth"}
deck.StartSlide()
deck.Text(10, 90, "Important Items", "sans", 5, "")
deck.List(10, 70, 4, items, "bullet", "sans", "red")
deck.EndSlide()
```

## Important Items

- First
- Second
- Third
- Fourth
- Fifth

```
// Picture with text annotation
quote := "Yours is some tepid, off-brand, generic 'cola'. " +
        "What I'm making is \"Classic Coke\""
person := "Heisenberg"
deck.StartSlide("black", "white")
deck.Image(50, 50, 1440, 900, "classic-coke.png")
deck.TextBlock(10, 80, quote, "sans", 2.5, 30, "")
deck.Text(65, 15, person, "sans", 1.2, "")
deck.EndSlide()
```



# A View of User Experience: Designing for People

Anthony Starks / ajstarks@gmail.com / @ajstarks

Design



What works good is better than what looks good, because what works good lasts.

Ray Eames

# Designing for People

title A View of User Experience: Designing for People Anthony Starks / ajstarks@gmail.com / @ajstarks

section Design gray white

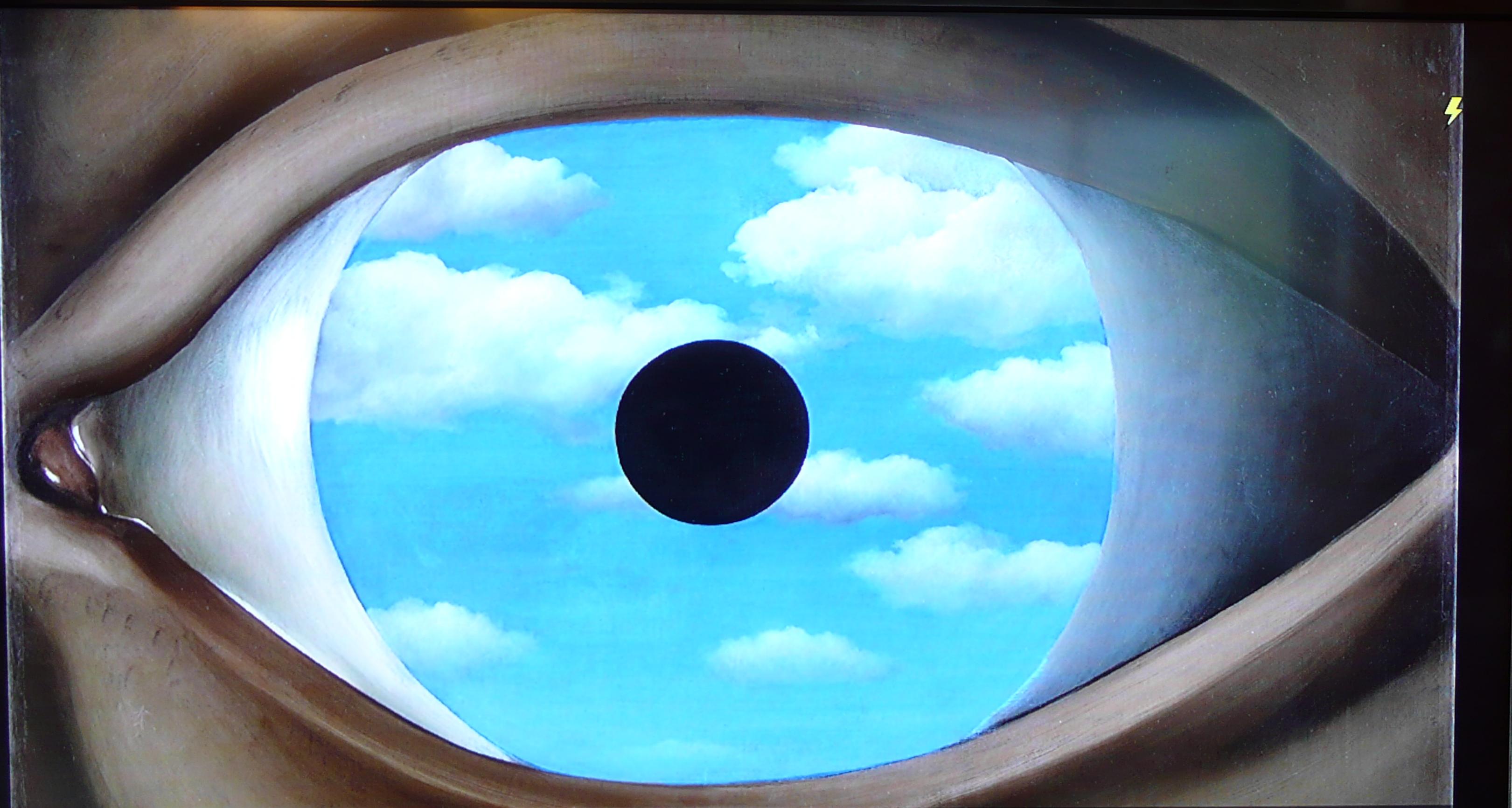
caption eames.png Ray Eames What works good is better than what looks good, because what works good last

capgen slides.txt | pdfdeck ... > slides.pdf

# Deck Web API

sex -dir [start dir] -listen [address:port] -maxupload [bytes]

GET	/	List the API
GET	/deck/	List the content on the server
GET	/deck/?filter=[type]	List content filtered by deck, image, video
POST	/deck/content.xml?cmd=1s	Play a deck with the specified duration
POST	/deck/content.xml?cmd=stop	Stop playing a deck
POST	/deck/content.xml?slide=[num]	Play deck starting at a slide number
DELETE	/deck/content.xml	Remove content
POST	/upload/ Deck:content.xml	Upload content
POST	/table/ Deck:content.txt	Generate a table from a tab-separated list
POST	/table/?textsize=[size]	Specify the text size of the table
POST	/media/ Media:content.mov	Play the specified video

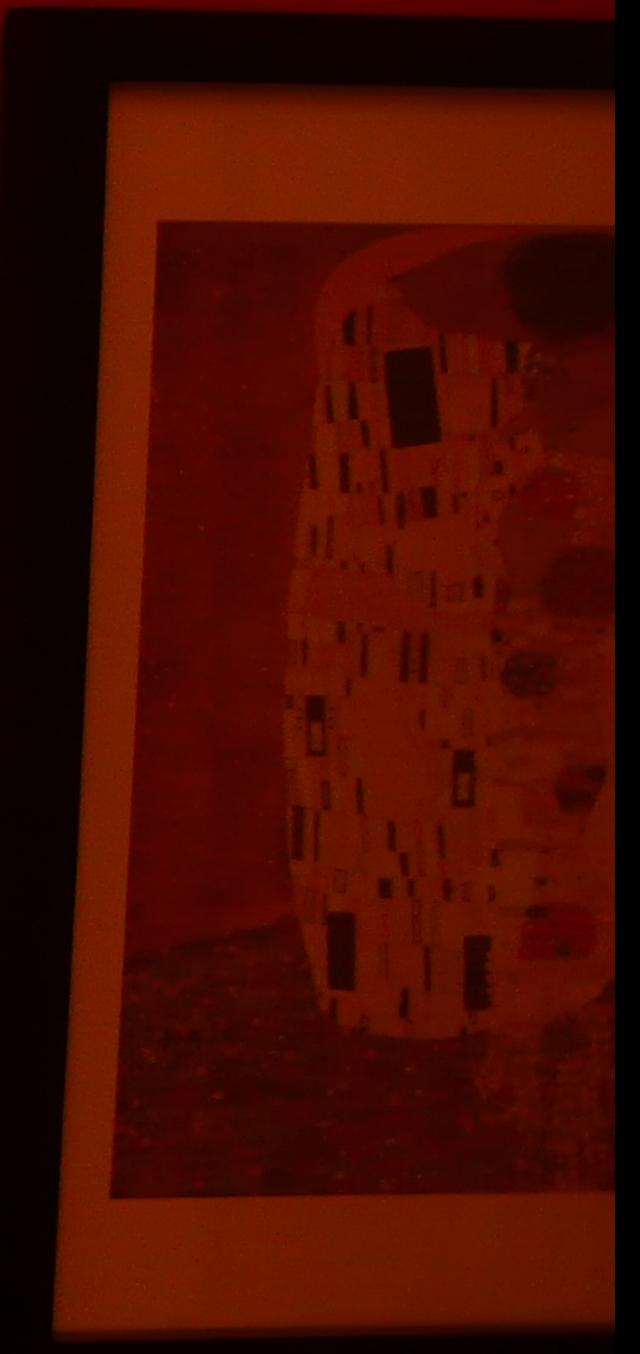


LG

Henri Matisse

Circus (Le Cirque) from Jazz

LG



# Design Examples

Top

Left

Right

Bottom

10%

30%

70%

10%

# Header (top 10%)

Summary  
(30%)

Detail  
(70%)

Footer (bottom 10%)

# My Story

## Section

One

Two

Three

Four

Five

Six

# Document Links

Add web and mailto links with the link attribute of the text element.

Once rendered as a PDF, clicking on the link opens the default browser or email client.

The image contains two screenshots. The top screenshot shows a PDF viewer window titled "deck-fira-4x3.pdf (page 53 of 57)". It displays a quote in white text on a dark blue background: "Python and Ruby programmers come to Go because they don't have to surrender much expressiveness, but gain performance and get to play with concurrency." Below the quote, it says "Less is exponentially more" and "Rob Pike". The bottom screenshot shows a web browser window titled "command center: Less is e...". The URL in the address bar is "commandcenter.blogspot.com/2012/06/less-is-exp...". The page content is identical to the quote in the PDF, along with some additional text and a "Read more" link.

Python and Ruby programmers come to Go because they don't have to surrender much expressiveness, but gain performance and get to play with concurrency.

Less is exponentially more  
Rob Pike

What you're given is a set of powerful but easy to understand, easy to use building blocks from which you can assemble—compose—a solution to your problem. It might not end up quite as fast or as sophisticated or as ideologically motivated as the solution you'd write in some of those other languages, but it'll almost certainly be easier to write, easier to read, easier to understand, easier to maintain, and maybe safer.

To put it another way, oversimplifying of course:

Python and Ruby programmers come to Go because they don't have to surrender much expressiveness, but gain performance and get to play with concurrency.

C++ programmers *don't* come to Go because they have fought hard to gain exquisite control of their programming domain, and don't want to surrender any of it. To them, software isn't just about getting the job done, it's about doing it a certain way.

The issue, then, is that Go's success would contradict their world view.

BOS



SFO

Virgin America 351

Gate B38

8:35am

On Time

JFK



IND

US Airways 1207

Gate C31C

5:35pm

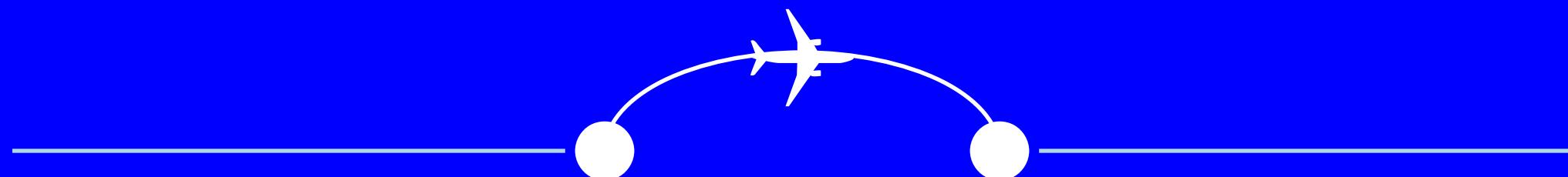
Delayed

# Flight Information

Los Angeles (LAX)



New York/Newark (EWR)



Distance Traveled

1,958 mi

3,151 km

Distance to Destination

596 mi

798 km

Time to Destination

Estimated time of arrival

Local time of arrival



1:20

12:14 am

12:14 am

Ground speed



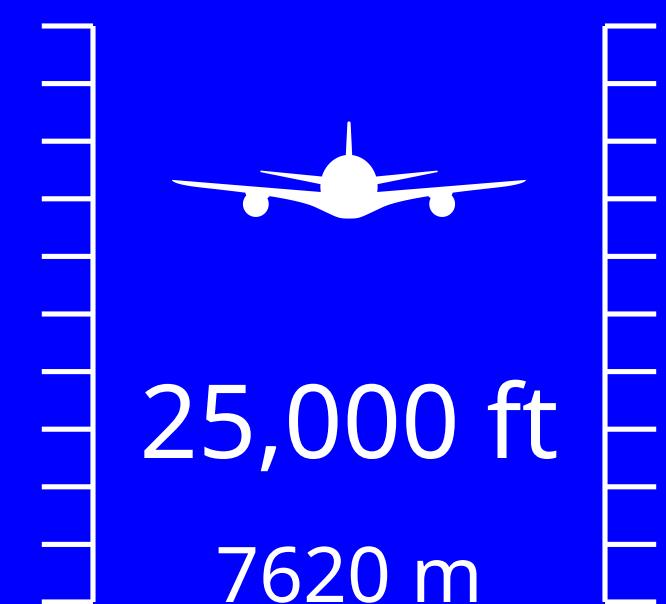
Headwind



Outside Temperature



Current Altitude



AAPL	179.98	3.04 (1.72%)
AMZN	1578.89	27.03 (1.74%)
FB	185.23	2.89 (1.58%)
GOOGL	1160.84	31.46 (2.79%)
MSFT	96.54	2.11 (2.23%)

AAPL	181.72	1.74 (0.97%)
AMZN	1598.39	19.50 (1.24%)
FB	184.76	-0.47 (-0.25%)
GOOGL	1165.93	5.09 (0.44%)
MSFT	96.77	0.23 (0.24%)

AAPL	175.30	-2.72 (-1.53%)
AMZN	1544.93	-26.75 (-1.70%)
FB	172.56	-12.53 (-6.77%)
GOOGL	1100.07	-34.35 (-3.03%)
MSFT	92.89	-1.71 (-1.81%)

```

func stockslide(deck *generate.Deck, symbols []string) {
    x := left
    y := top

    rintr := (top-bottom)/float64(len(symbols))
    size := rintr/2.5
    cintr := size*4

    var color string
    for _, s := range symbols {
        stock, err := stockapi(s)
        if err != nil || stock.Symbol == "" {
            continue
        }
        if stock.Change < 0 {
            color = negcolor
        } else {
            color = poscolor
        }
        deck.Text(x, y, stock.Symbol, "sans", size, "")
        x += cintr * 2
        deck.TextEnd(x, y, fmt.Sprintf("%.2f", stock.Price), "sans", size, "")
        x += cintr
        deck.TextEnd(x, y, fmt.Sprintf("%.2f", stock.Change), "sans", size, color)
        x += cintr
        deck.TextEnd(x, y, fmt.Sprintf("(%.2f%%)", stock.PctChange), "sans", size, color)
        x = left
        y -= rintr
    }
    deck.Text(footx, footy, time.Now().Format("2006-01-02 15:04:05"), "sans", 1.5, "yellow")
}

```

AAPL	181.72	1.74 (0.97%)
AMZN	1598.39	19.50 (1.24%)
FB	184.76	-0.47 (-0.25%)
GOOGL	1165.93	5.09 (0.44%)
MSFT	96.77	0.23 (0.24%)

2018-03-12 21:05:06

```

package main

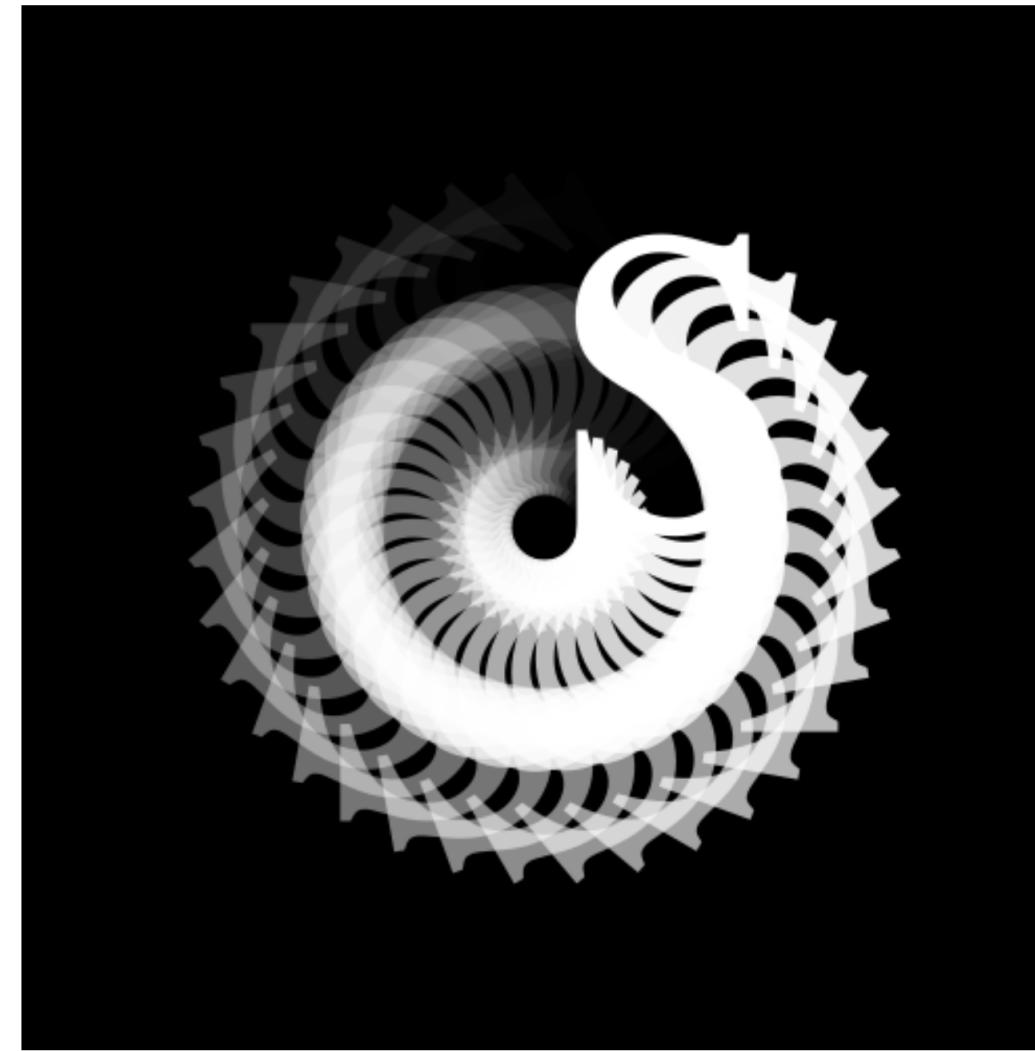
import (
    "os"
    "github.com/ajstarks/svg"
)

var (
    canvas = svg.New(os.Stdout)
    width  = 500
    height = 500
)

func main() {
    a := 1.0
    ai := 0.03
    ti := 10.0

    canvas.Start(width, height)
    canvas.Rect(0, 0, width, height)
    canvas.Gstyle("font-family:serif;font-size:244pt")
    for t := 0.0; t <= 360.0; t += ti {
        canvas.TranslateRotate(width/2, height/2, t)
        canvas.Text(0, 0, "s", canvas.RGBA(255, 255, 255, a))
        canvas.Gend()
        a -= ai
    }
    canvas.Gend()
    canvas.End()
}

```

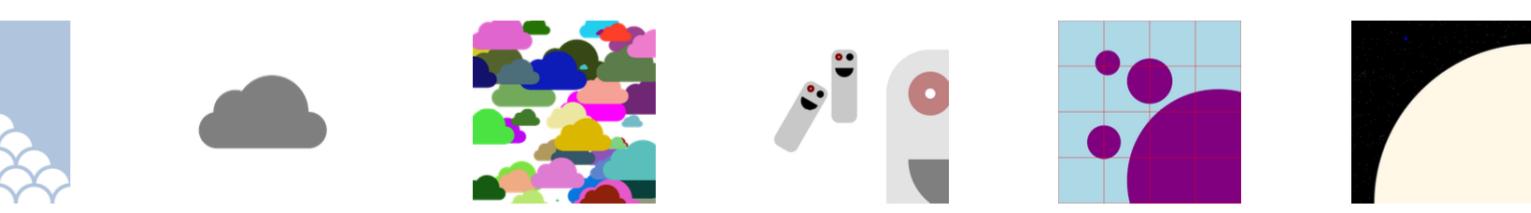


rottext.go [36]

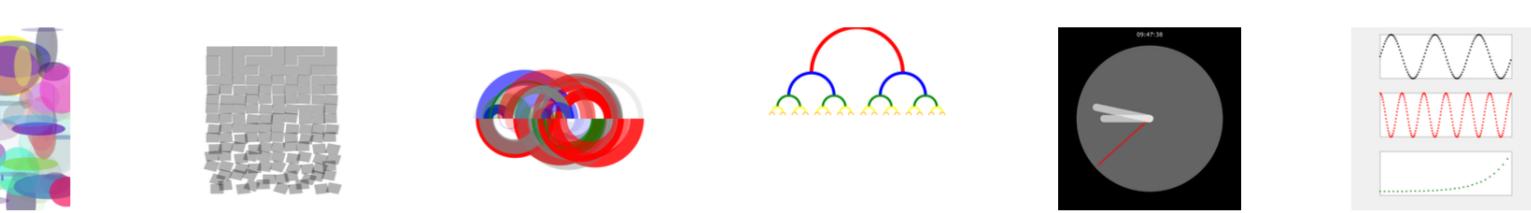
## SVG Examples



concentric.go    concentric2.go    cgrid.go    diag.go    shining.go    mondrian.go



id.go    cloud.go    color-clouds.go    creepy.go    d4h.go    sunearth.go



ot.go    schotter.go    randarc.go    recurse.go    clock.go    plotfunc.go



fontrange.go    uni.go    lorem.go    rotate.go    rotate.go    rottext.go



# codepicdeck

# Genesis 3



Now the serpent was more subtil than any beast of the field which the LORD God had made. And he said unto the woman, Yea, hath God said, Ye shall not eat of every tree of the garden? And the woman said unto the serpent, We may eat of the fruit of the trees of the garden: But of the fruit of the tree which is in the midst of the garden, God hath said, Ye shall not eat of it, neither shall ye touch it, lest ye die. And the serpent said unto the woman, Ye shall not surely die: For God doth know that in the day ye eat thereof, then your eyes shall be opened, and ye shall be as gods, knowing good and evil.

# Initech Collaboration Profiles

## Samir Nagheenanajar



ROLE Design and UX Head  
LOCATION Bridgewater, NJ

"I'm all about applying great design to all our products. We should provide a good experience in everything we do."

### TECHNOLOGY

IT and Internet

Software

### GOALS/LIKES

- To have simple intuitive tools
- Be open to new tools and methods
- To apply good design across the whole environment

### FRUSTRATIONS

- One size fits all mentality
- IT imposing tools with no real input
- Not designing for multiple form-factors and use-cases

### PERSONALITY

Extravert

Introvert

Sensing

Intuition

Thinking

Feeling

Judging

Percieving

### SUMMARY

Technically savvy, and demanding, Samir appreciates the value of good design, and is frustrated when the collaboration products fall short in this regard. On the other hand, he will actively promote tools that are designed well, and is very willing to share his knowledge and insights. Further, Samir will be a strong advocate for new effective ways of working together.

### RELATED QUESTIONS

- Why do we use outdated products?
- What are the cultural aspects of collaboration?
- When will design be included in our requirements?
- Is the concept of the Intranet outdated?
- What is the cost to start over with new technologies?

So, the next time you're  
about to make a subclass,  
think hard and ask yourself

**what would Go do**

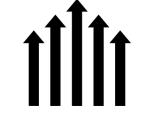
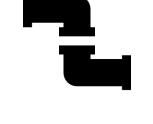
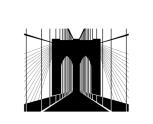
Andrew Mackenzie-Ross



# go

build	compile packages and dependencies
clean	remove object files
doc	show documentation for package or symbol
env	print Go environment information
fix	run go tool fix on packages
fmt	run gofmt on package sources
generate	generate Go files by processing source
get	download and install packages and dependencies
install	compile and install packages and dependencies
list	list packages
run	compile and run Go program
test	test packages
tool	run specified go tool
version	print Go version
vet	run go tool vet on packages

# Go Proverbs

-  Don't communicate by sharing memory, share memory by communicating.
-  Concurrency is not parallelism.
-  Channels orchestrate; mutexes serialize.
-  The bigger the interface, the weaker the abstraction.
-  Make the zero value useful.
-  interface{} says nothing.
-  Gofmt's style is no one's favorite, yet gofmt is everyone's favorite.
-  A little copying is better than a little dependency.
-  Syscall must always be guarded with build tags.
-  Cgo must always be guarded with build tags.
-  Cgo is not Go.
-  With the unsafe package there are no guarantees.
-  Clear is better than clever.
-  Reflection is never clear.
-  Errors are values.
-  Don't just check errors, handle them gracefully.
-  Design the architecture, name the components, document the details.
-  Documentation is for users.
-  Don't panic.



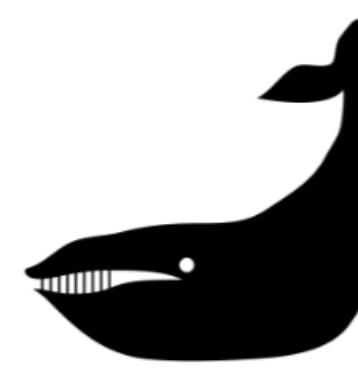
Don't communicate  
by sharing memory,  
share memory by  
communicating.



Concurrency is not  
parallelism.



Channels orchestrate;  
mutexes serialize.



The bigger the interface,  
the weaker the abstraction.



Make the zero  
value useful.

The new masters of our universe are people who are essentially only half-educated.

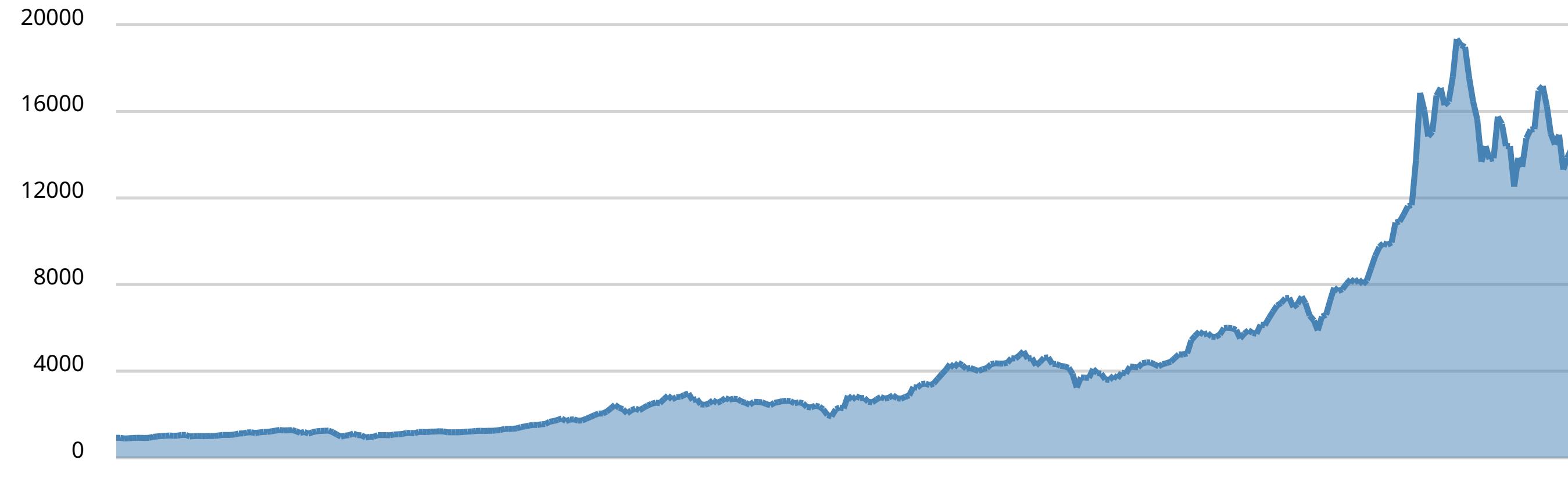
They have had no exposure to the humanities or the social sciences, the academic disciplines that aim to provide some understanding of how society works, of history and of the roles that beliefs, philosophies, laws, norms, religion and customs play in the evolution of human culture

John Naughton, The Guardian, 19 November, 2017

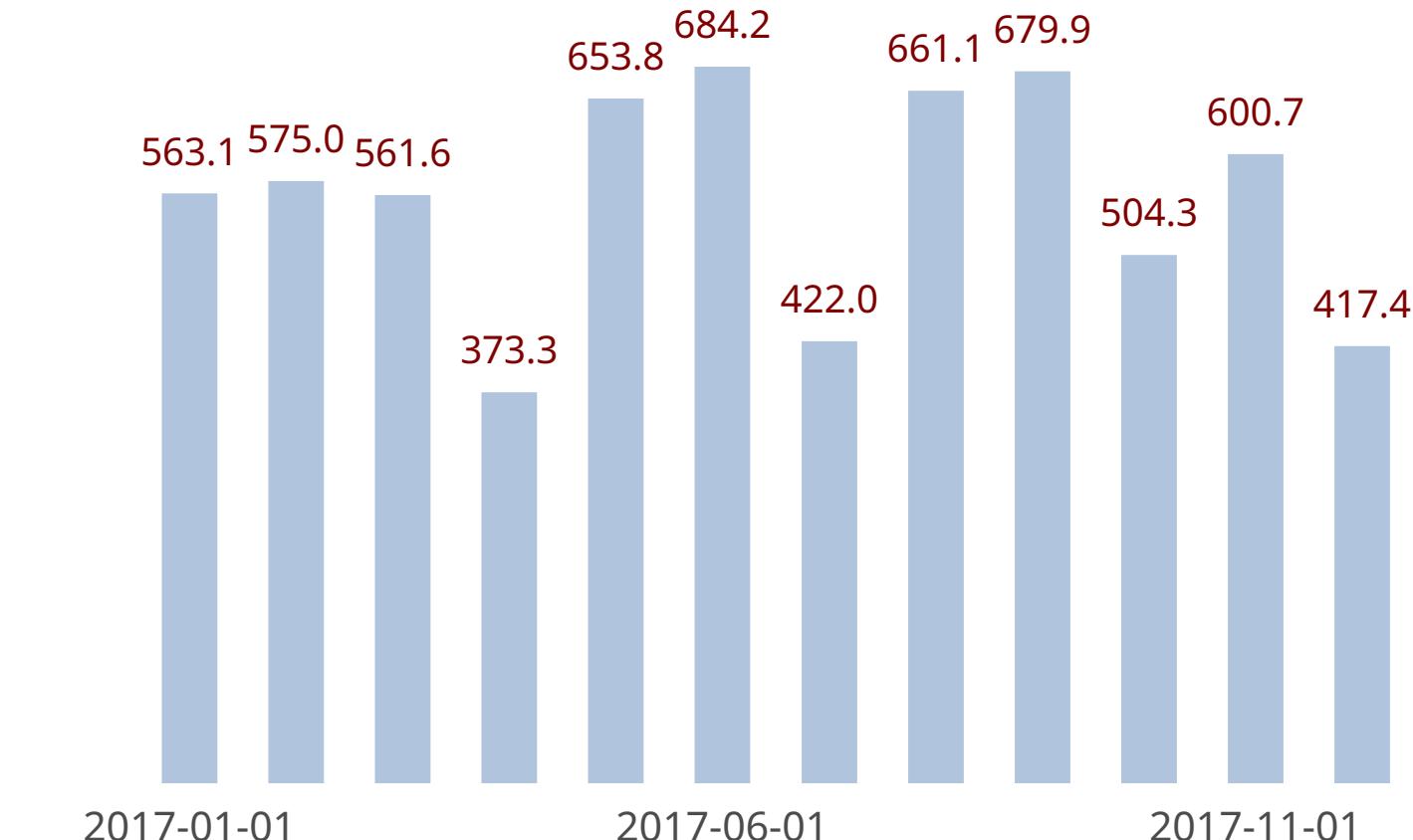


# dchart: charts for deck

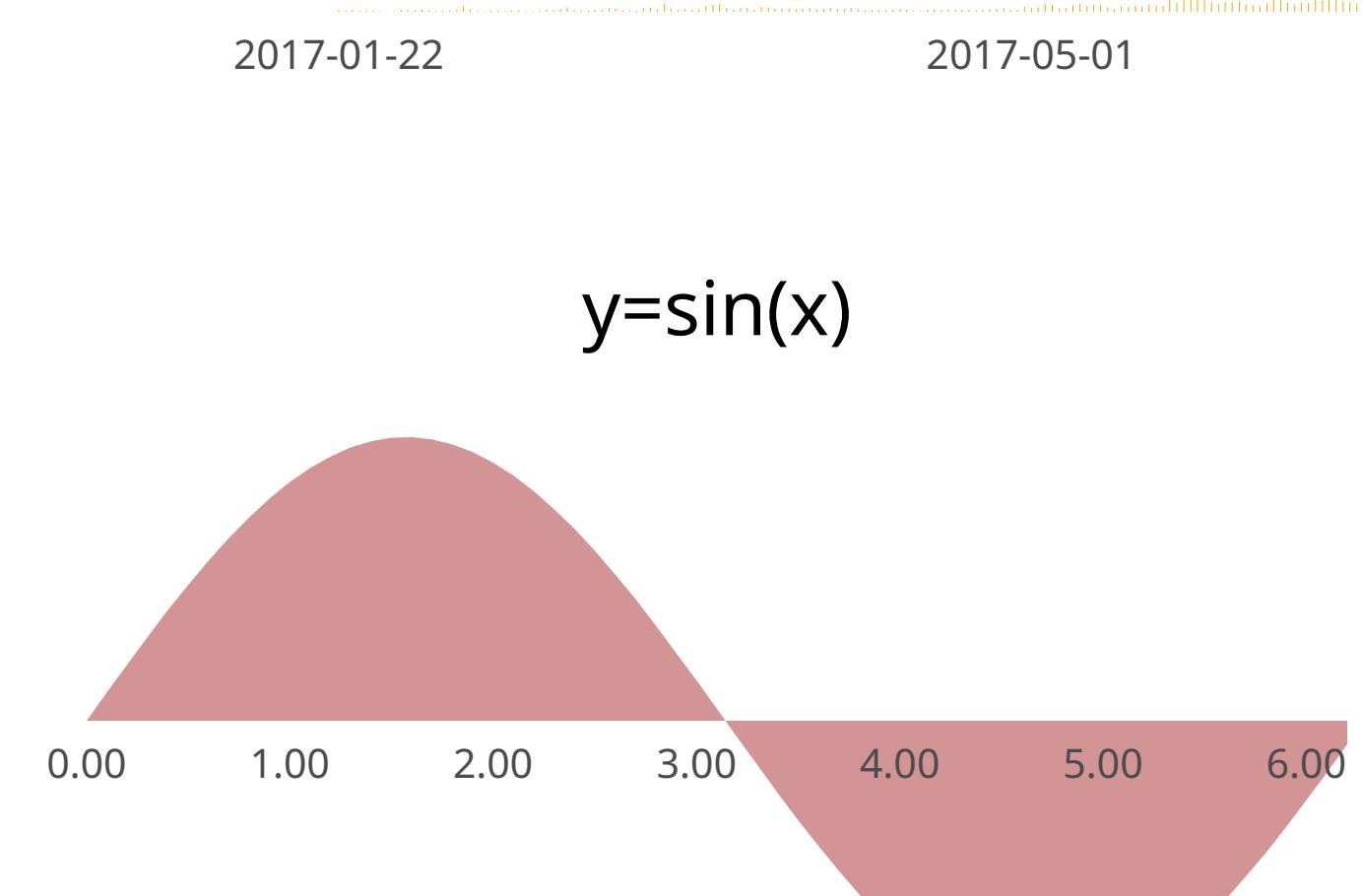
BITCOIN to USD



AAPL Volume



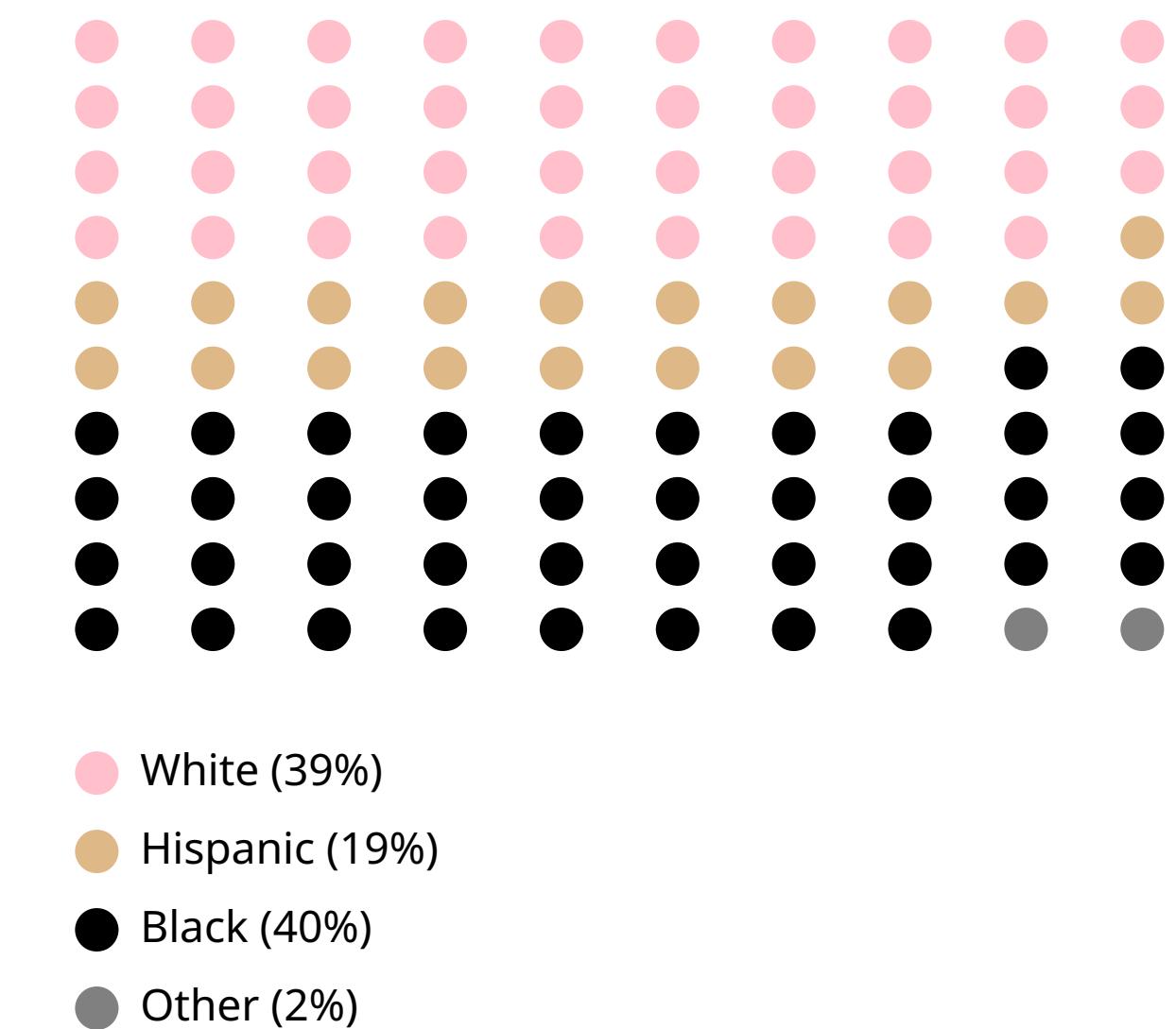
y=sin(x)

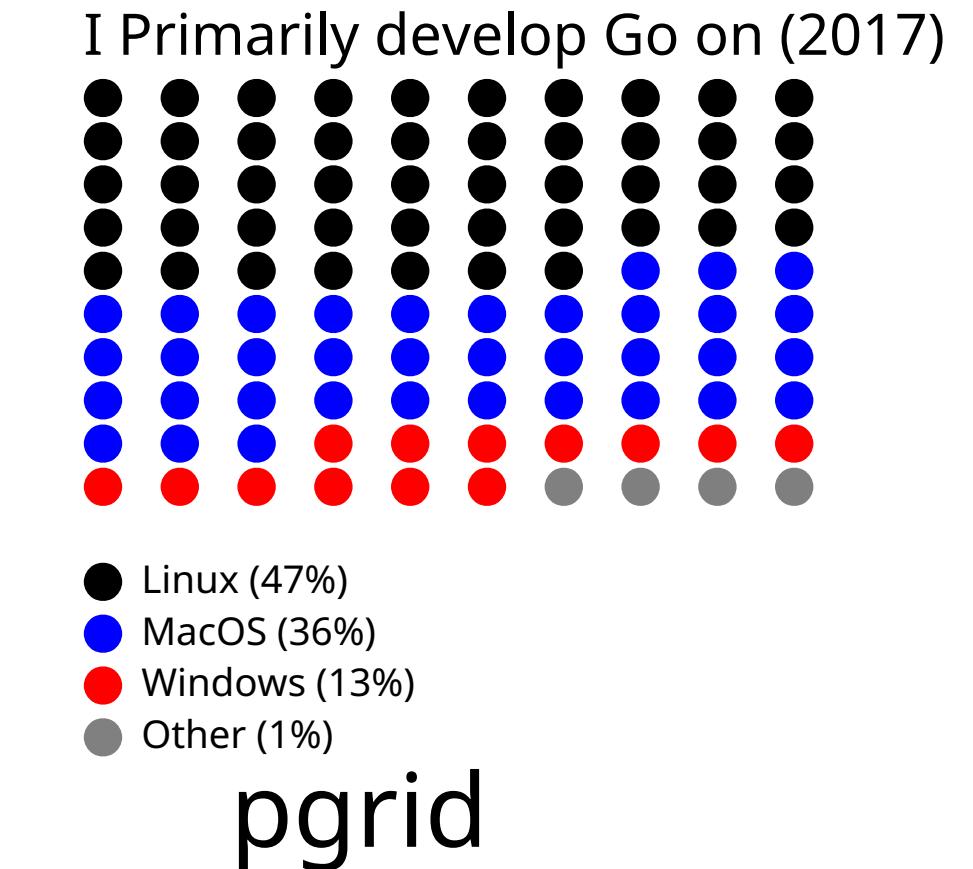
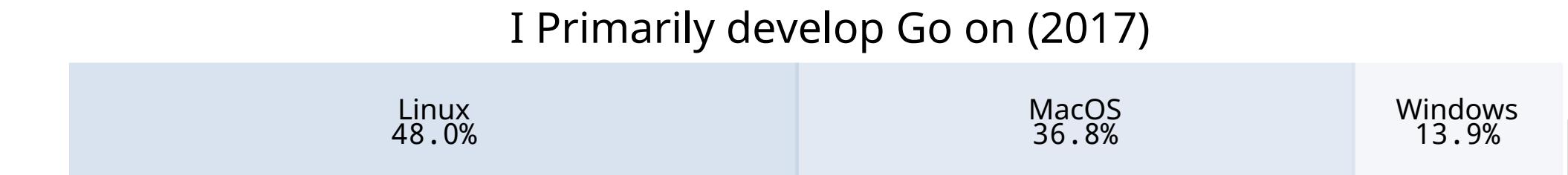
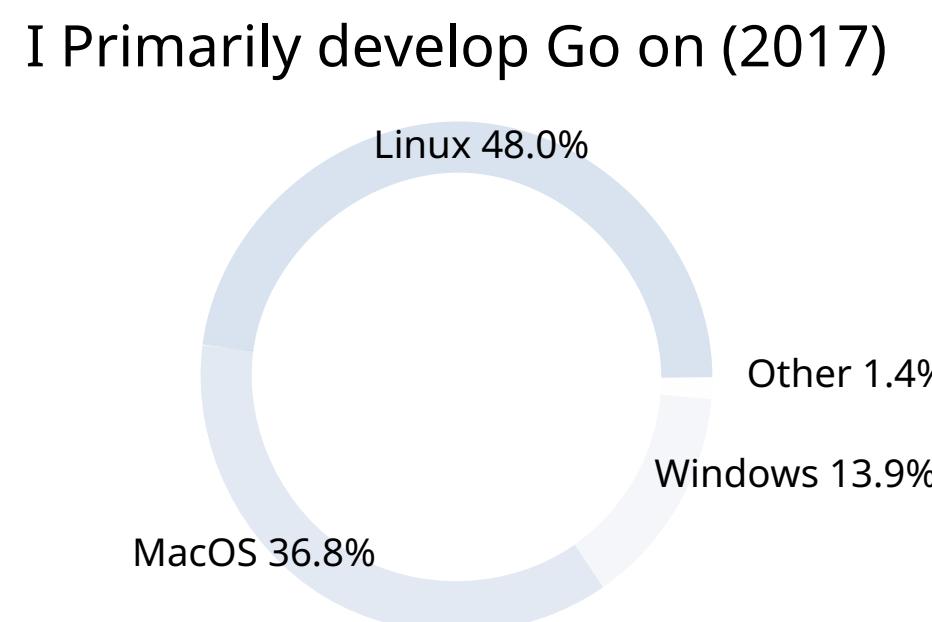
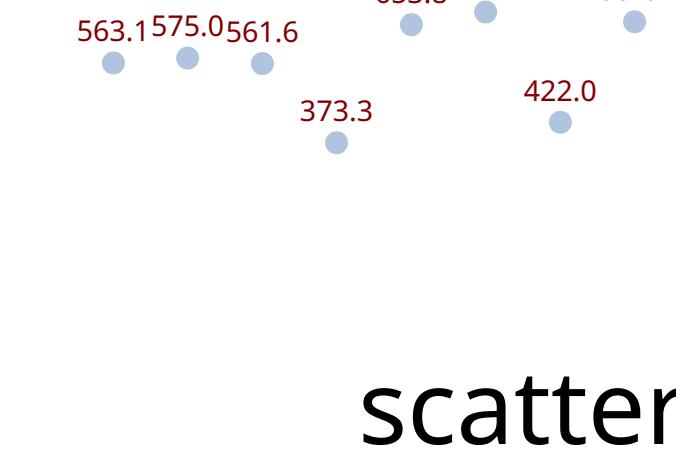
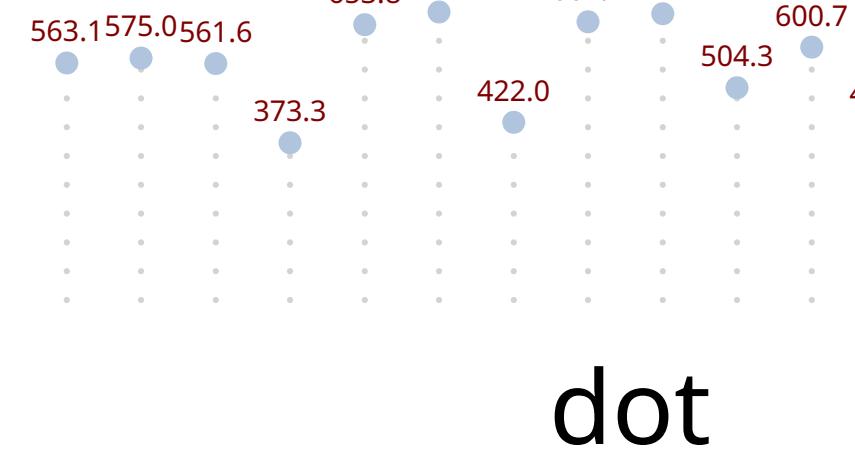
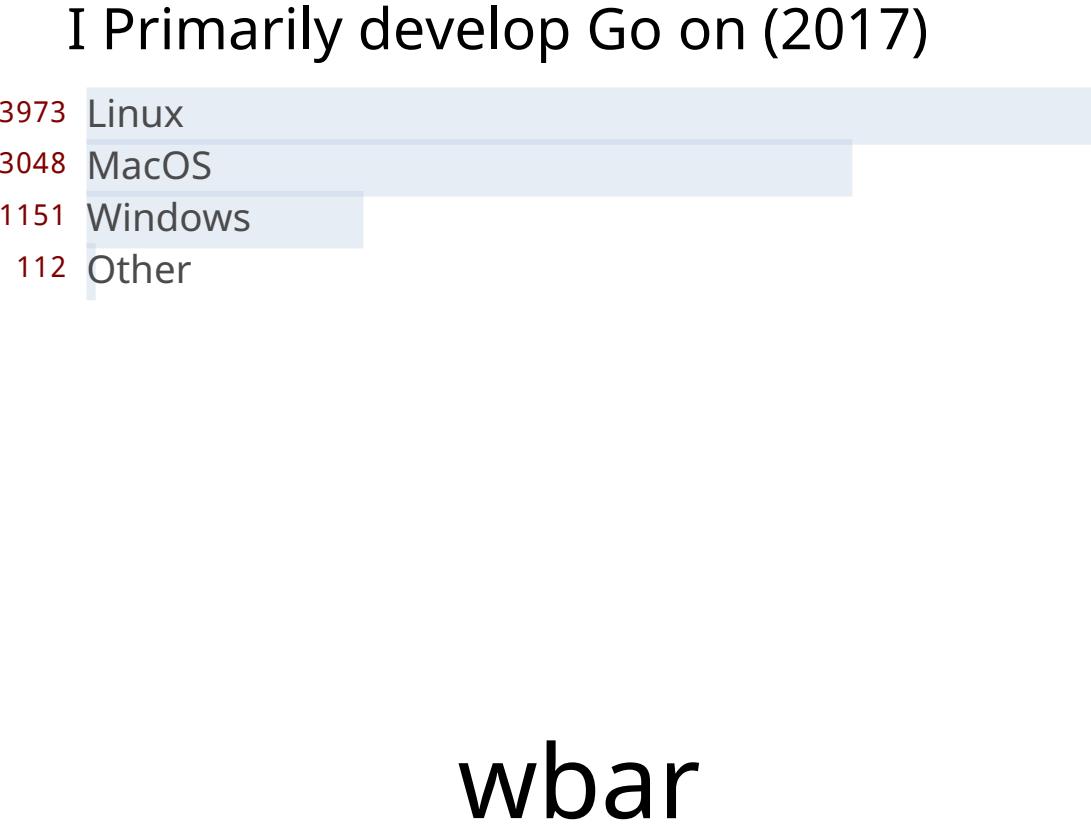
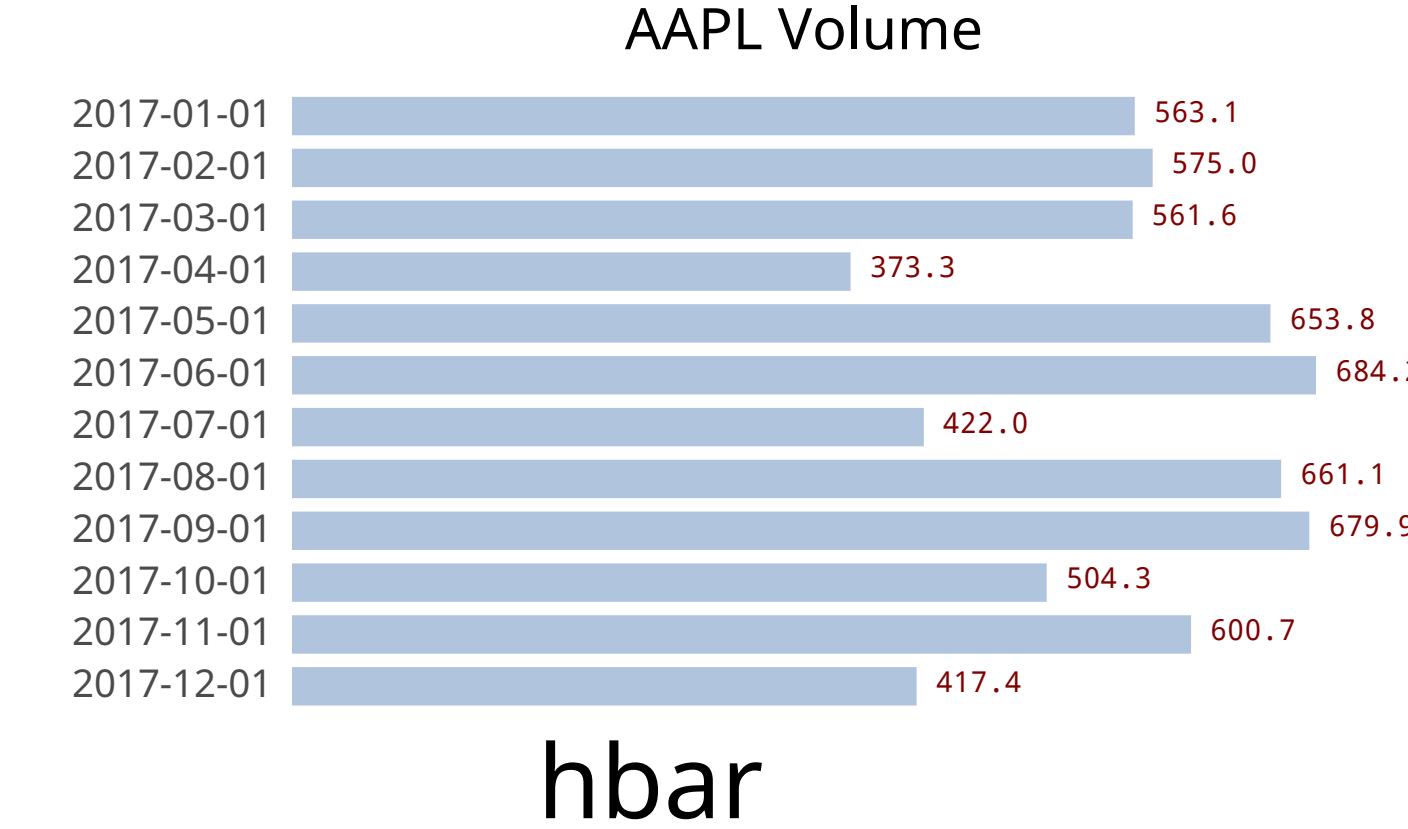
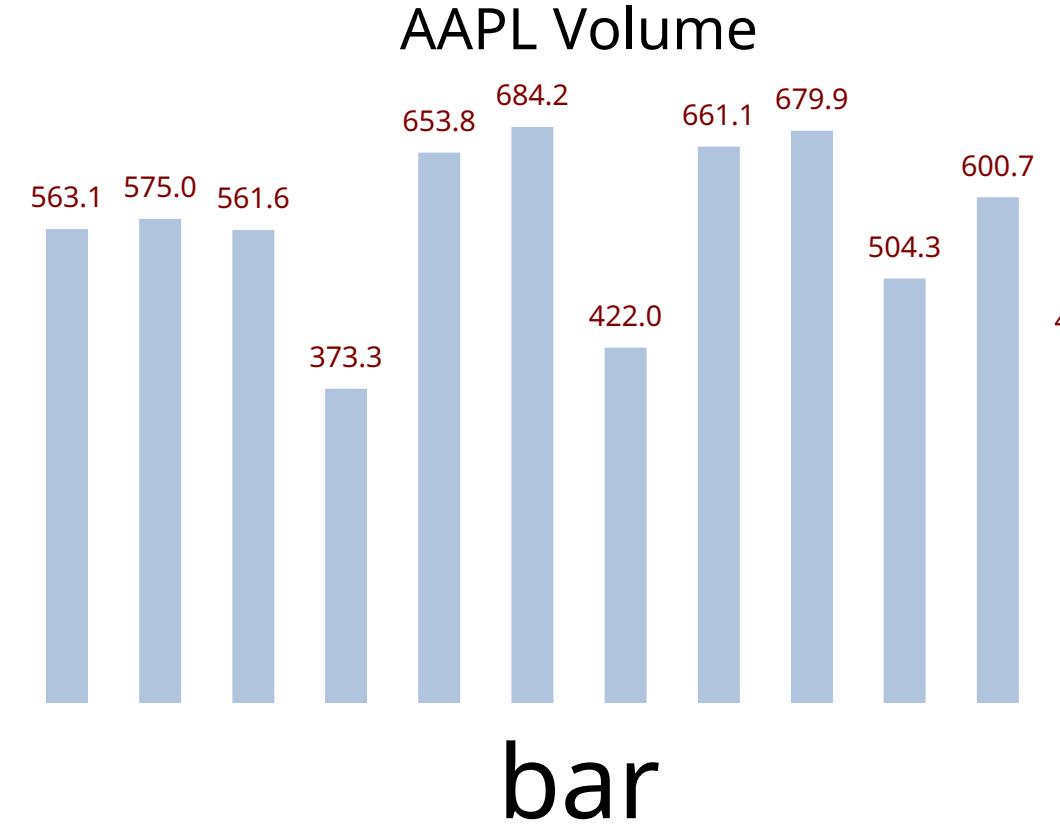


Browser Market Share Dec 2016-Dec 2017



US Incarceration Rate



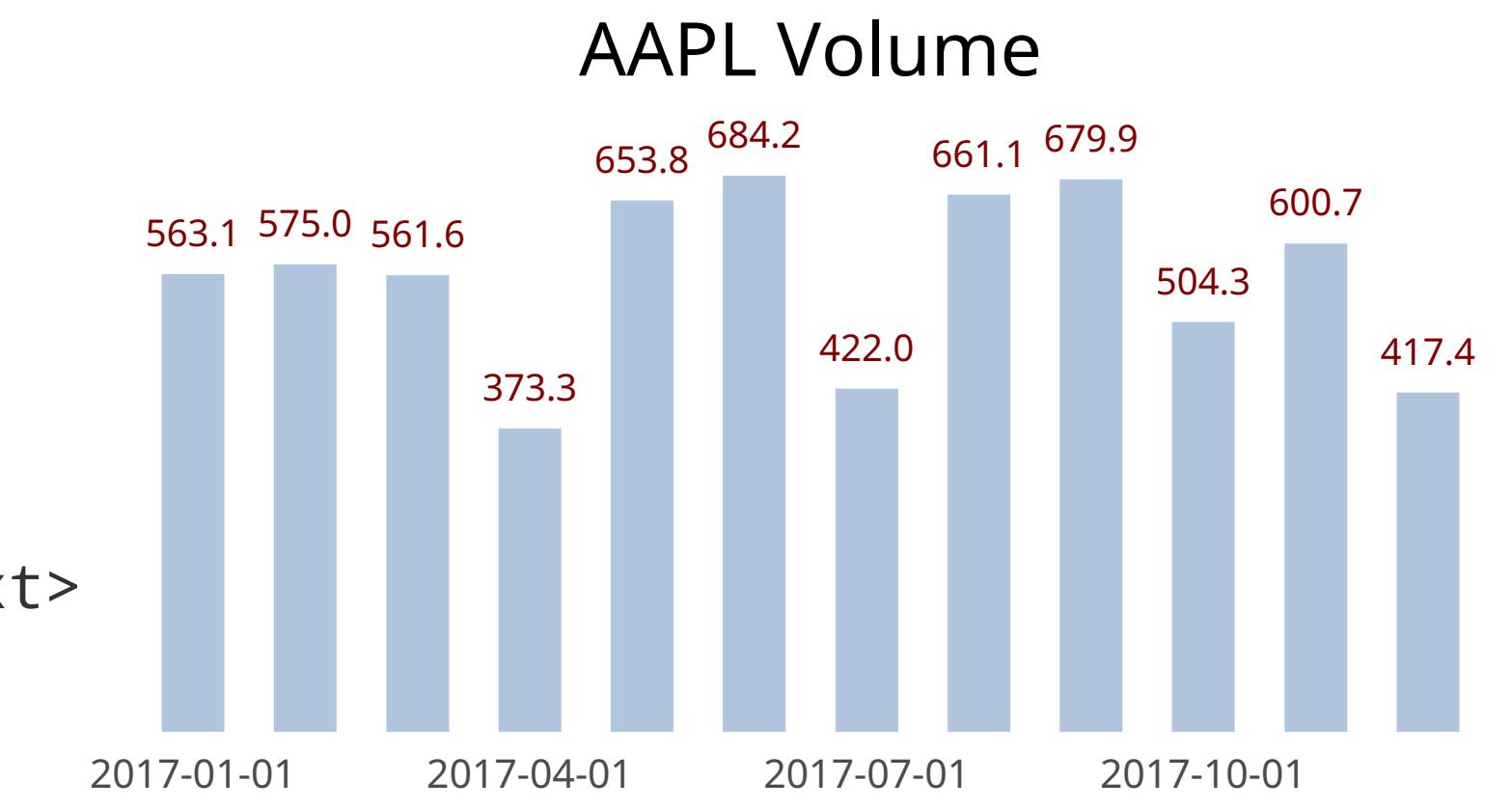


donut

pmap

```
# AAPL Volume
2017-01-01      563.122
2017-02-01      574.969
2017-03-01      561.628
2017-04-01      373.304
2017-05-01      653.755
2017-06-01      684.178
2017-07-01      421.992
2017-08-01      661.069
2017-09-01      679.879
2017-10-01      504.291
2017-11-01      600.663
2017-12-01      417.354
```

```
<deck>
  <slide>
    <text ...>AAPL Volume</text>
    <line ... color="lightsteelblue"/>
    <text ... color="rgb(127,0,0)">563.1</text>
    <text ... color="rgb(75,75,75)">2017-01-01</text>
  </slide>
</deck>
```



data | dchart | pdf

# Chart Types

-bar	bar chart (default true)
-wbar	word bar chart (default false)
-hbar	horizontal bar chart (default false)
-scatter	scatter chart (default false)
-dot	dot plot (default false)
-line	line chart (default false)
-vol	volume plot (default false)
-pgrid	proportional grid (default false)
-pmap	proportional map (default false)
-donut	donut chart (default false)

# Chart Elements

-grid	show gridlines on the y axis (default false)
-val	show values (default true)
-valpos	value position (t=top, b=bottom, m=middle) (default "t")
-yaxis	show a y axis (default true)
-yrange	specify the y axis labels (min,max,step)
-fulldeck	generate full deck markup (default true)
-title	show the title (default true)
-charttitle	specify the title (overiding title in the data)
-xlabel	x axis label interval (default 1, 0 to supress all labels)
-xlast	show the last x label
-hline	horizontal line at value with label

# Position and Scaling

-top	top of the plot (default 80)
-bottom	bottom of the plot (default 30)
-left	left margin (default 20)
-right	right margin (default 80)
-min	set the minimum value
-max	set the maximum value
-dmin	data minimum (default false, min=0)

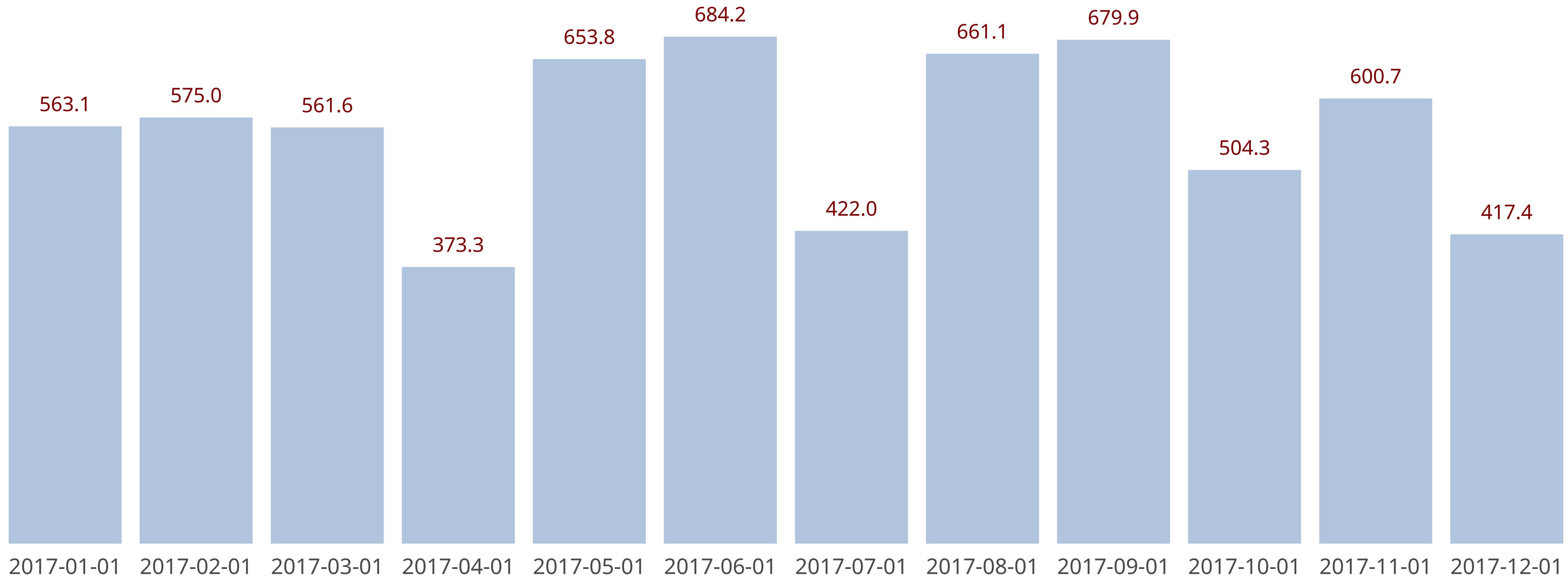
# Measures and Attributes

-barwidth	barwidth (default computed from data size)
-ls	linespacing (default 2.4)
-textsize	text size (default 1.5)
-color	data color (default "lightsteelblue")
-vcolor	value color (default "rgb(127,0,0)")
-datafmt	data format for values (default "%.1f")
-psize	diameter of the donut (default 30)
-pwidth	width of the donut or proportional map (default 3)

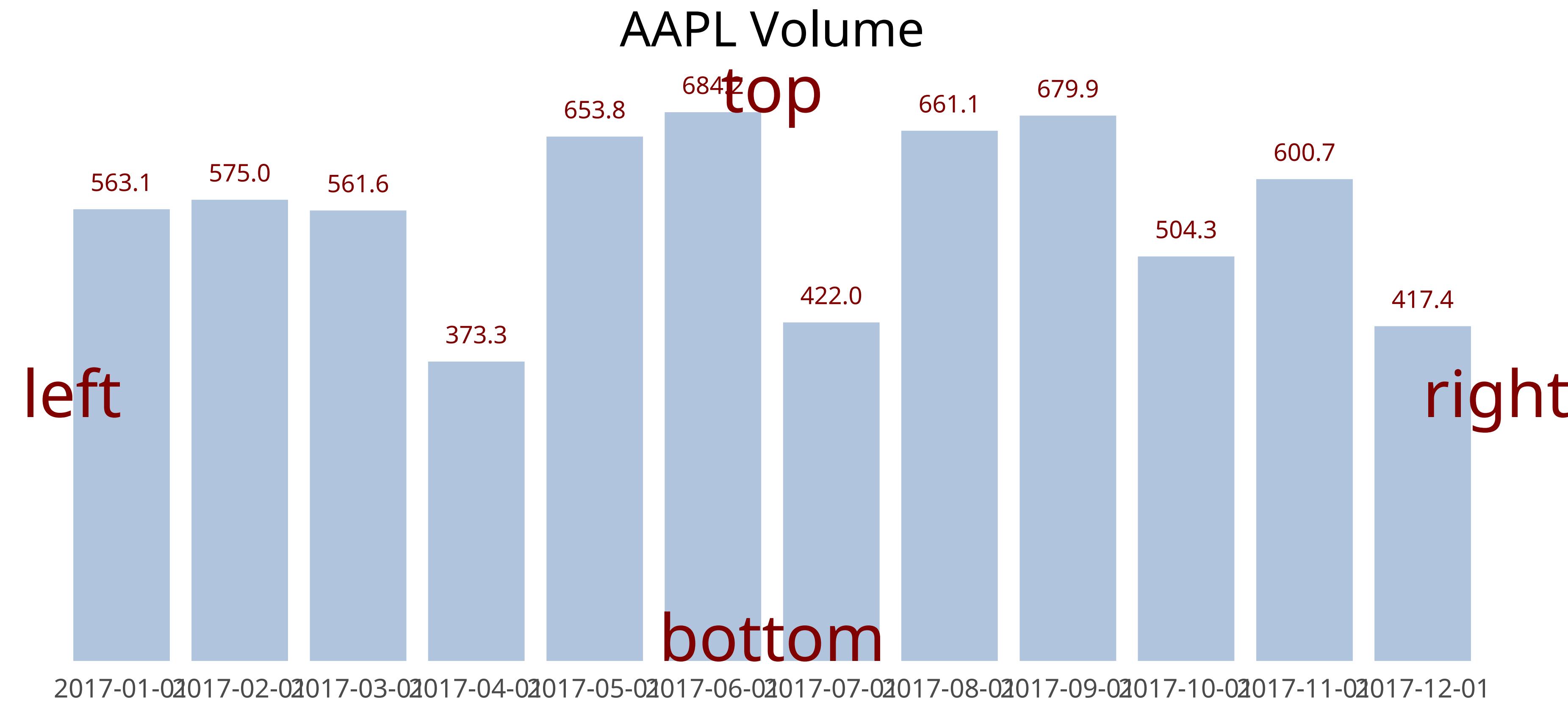
# CSV

-csv	read CSV files (default false)
-csvcol	specify the columns to use for label,value

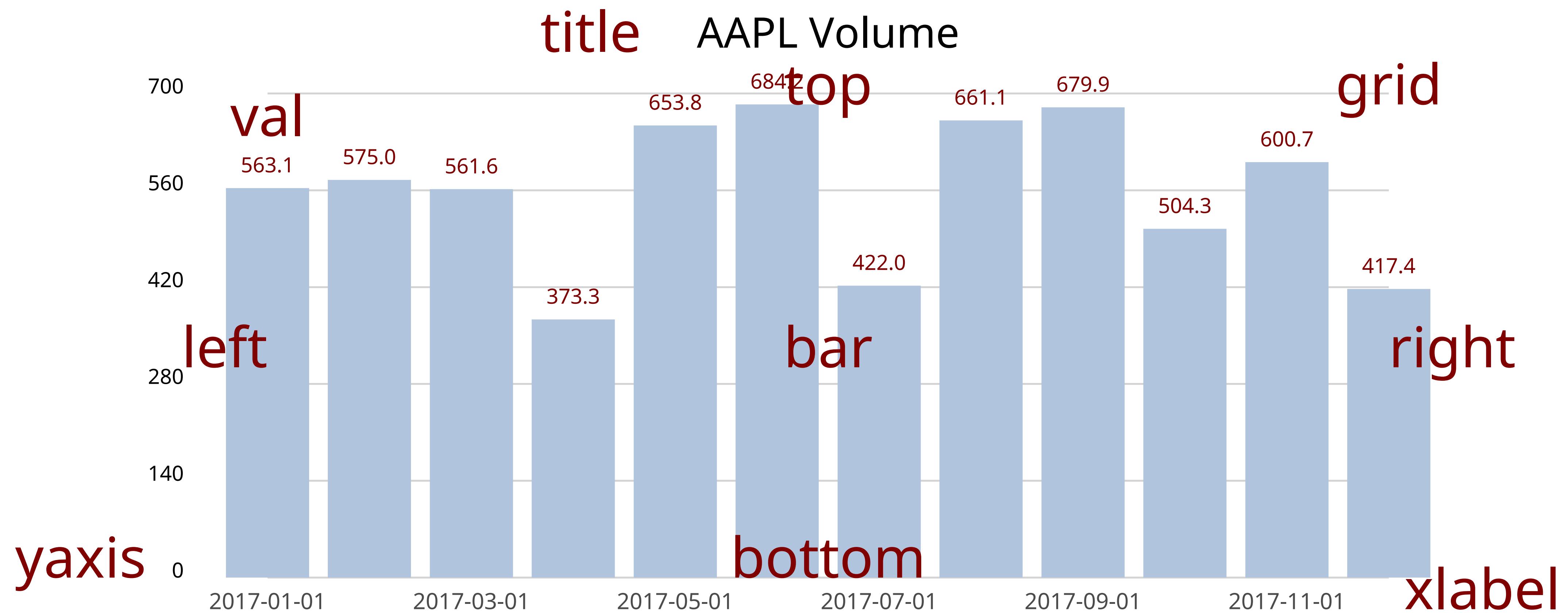
## AAPL Volume



dchart AAPL.d



```
dchart -left=20 -right=80 -top=75 AAPL.d
```



```
dchart -left=20 -right=80 -top=75 -yaxis -xlabel=2 -grid AAPL.d
```

```

package main

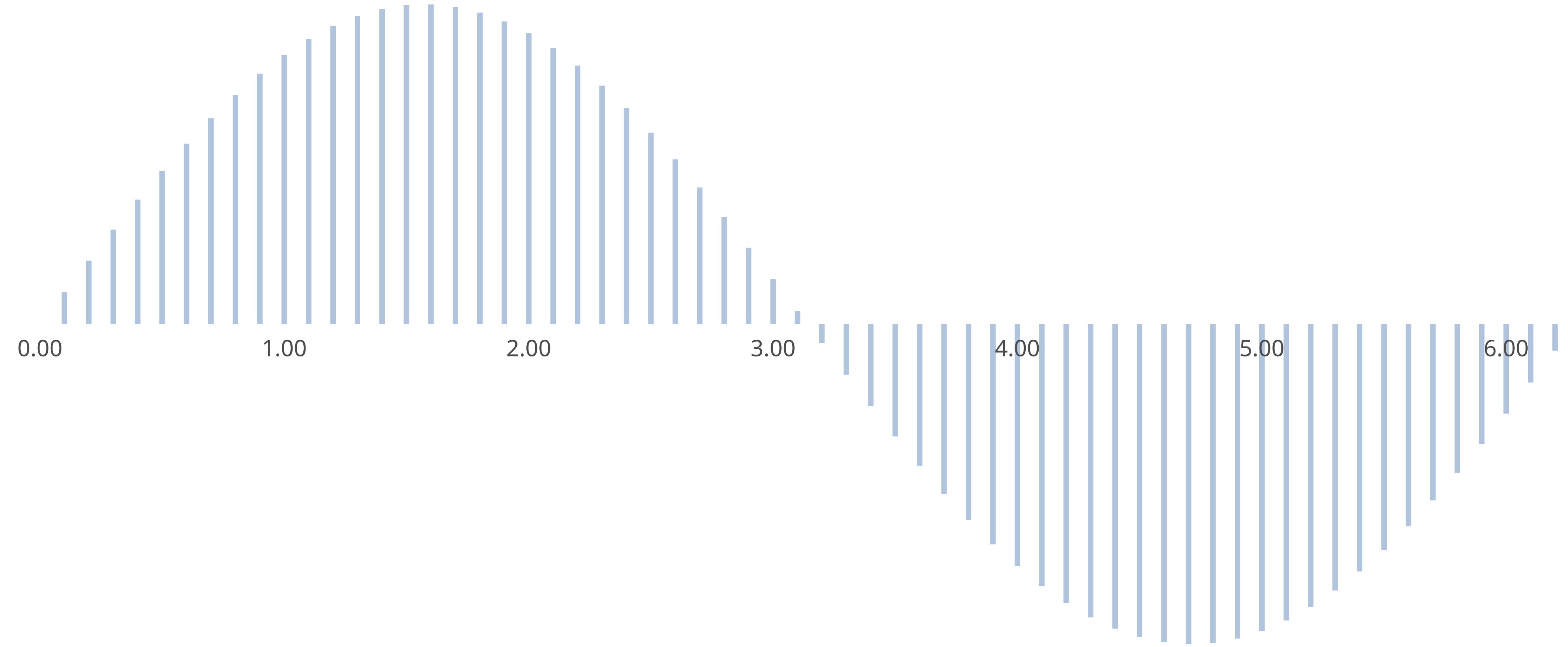
import (
    "fmt"
    "math"
)

func main() {
    fmt.Println("# y=sin(x)")
    for x := 0.0; x < math.Pi*2; x += 0.1 {
        fmt.Printf("%.2f\t%.4f\n", x, math.Sin(x))
    }
}

```

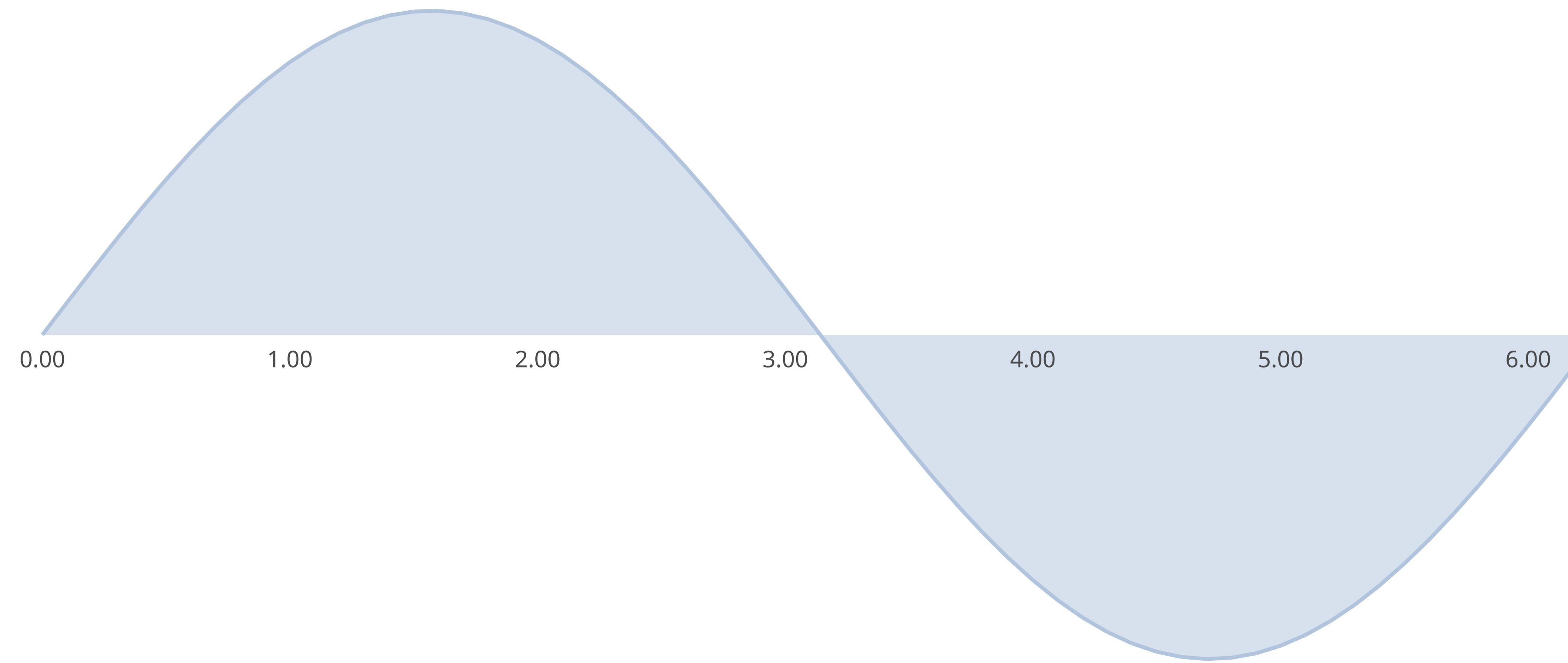
#	y=sin(x)
0.00	0.0000
0.10	0.0998
0.20	0.1987
0.30	0.2955
0.40	0.3894
0.50	0.4794
0.60	0.5646
0.70	0.6442
0.80	0.7174
...	
5.80	-0.4646
5.90	-0.3739
6.00	-0.2794
6.10	-0.1822
6.20	-0.0831

$y=\sin(x)$



sine | dchart -val=f -bottom=50 -xlabel=10

$y=\sin(x)$



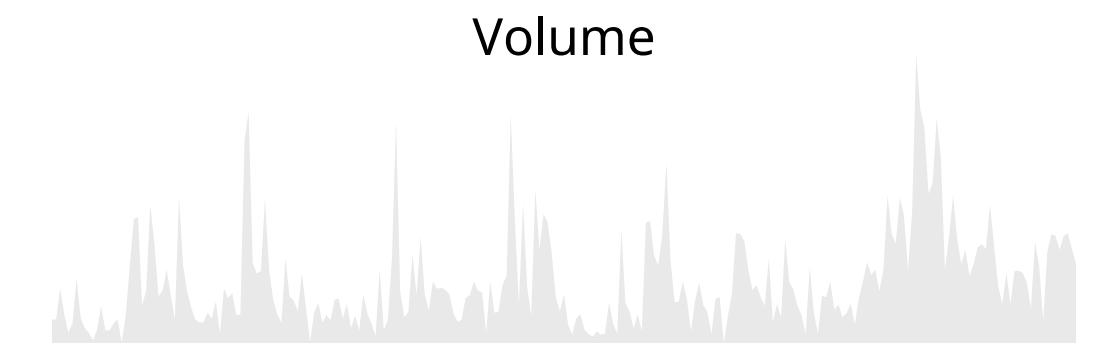
sine | dchart -val=f -bottom=50 -xlabel=10 -bar=f -line -vol

# Tech Stock Performance

Apr 2 2017 - Apr 2 2018

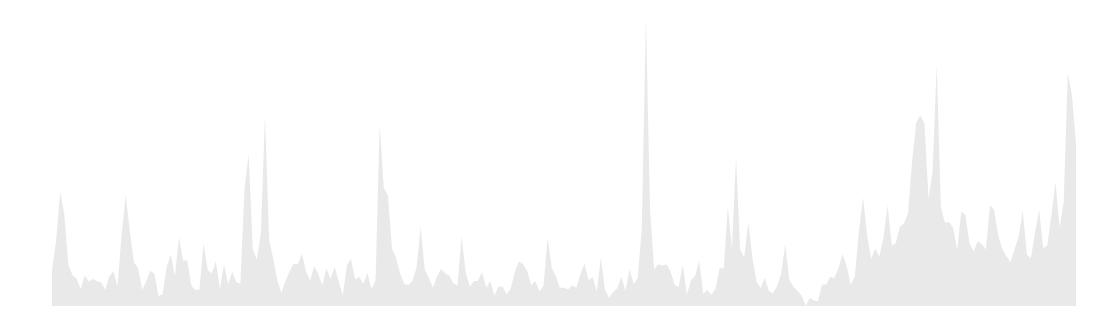
Apple

AAPL



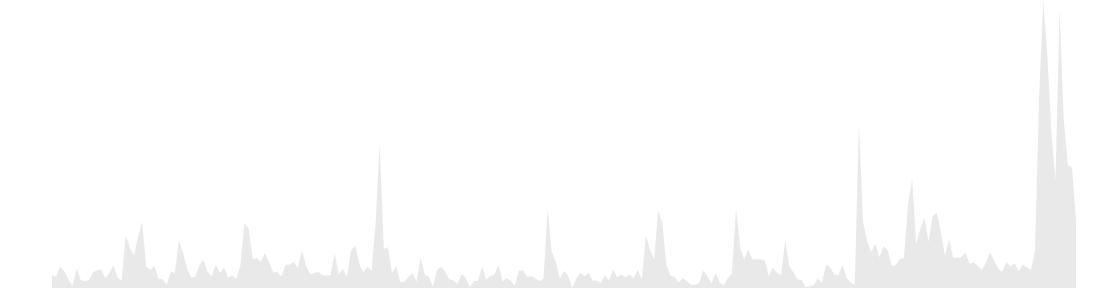
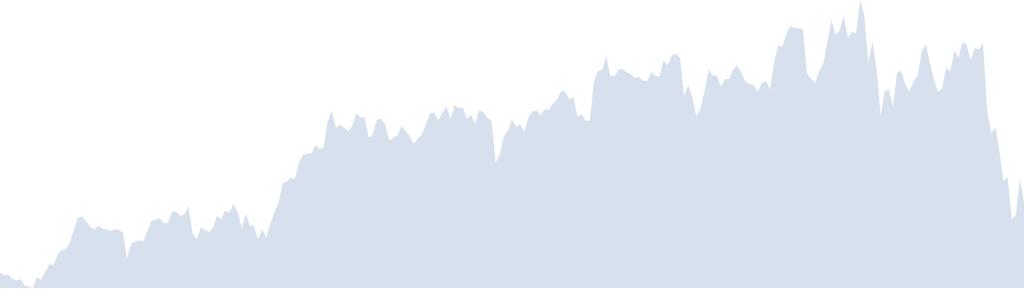
Amazon.com

AMZN



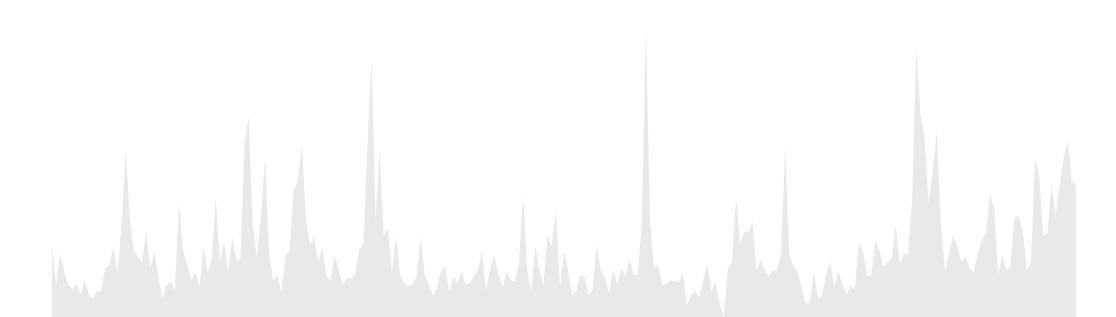
Facebook

FB



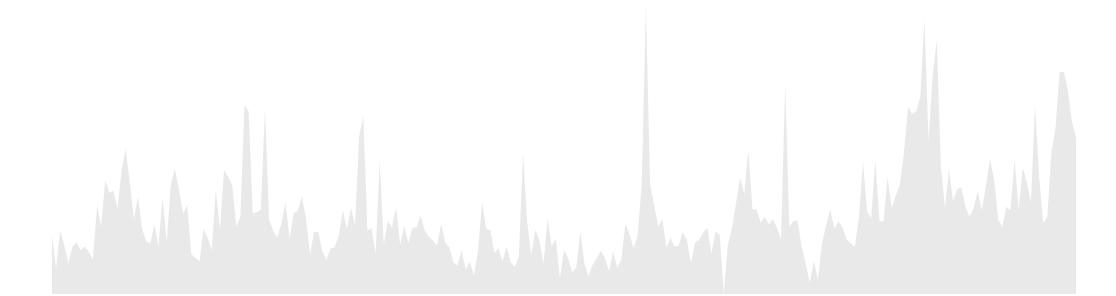
Alphabet

GOOG



Microsoft

MSFT

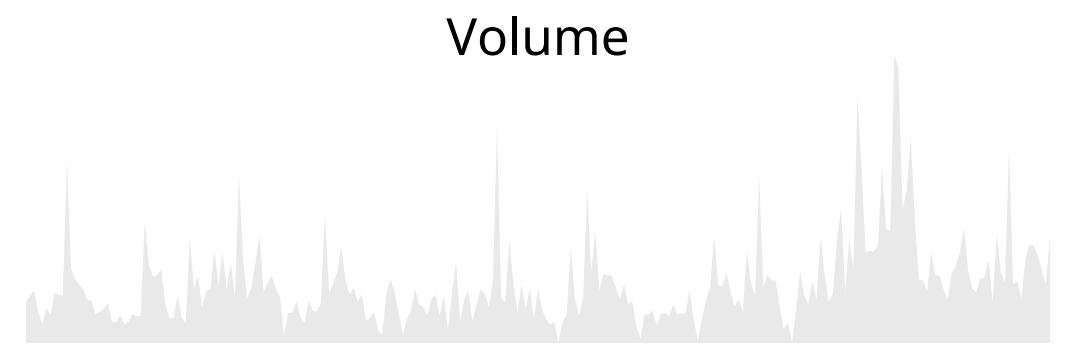


# Pharma Stock Performance

Apr 2 2017 - Apr 2 2018

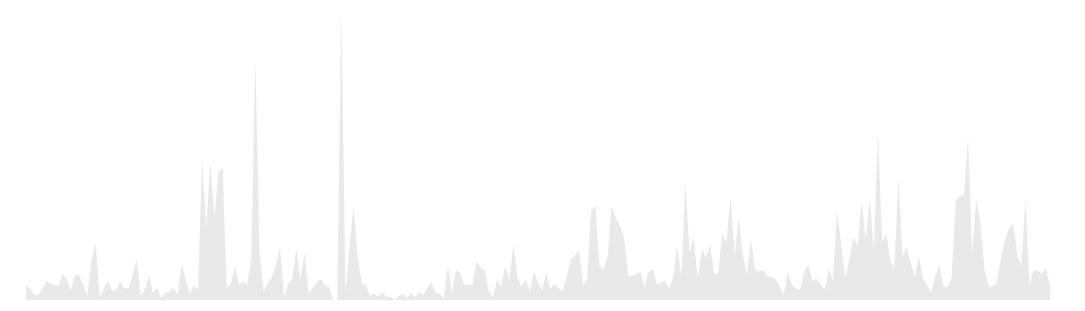
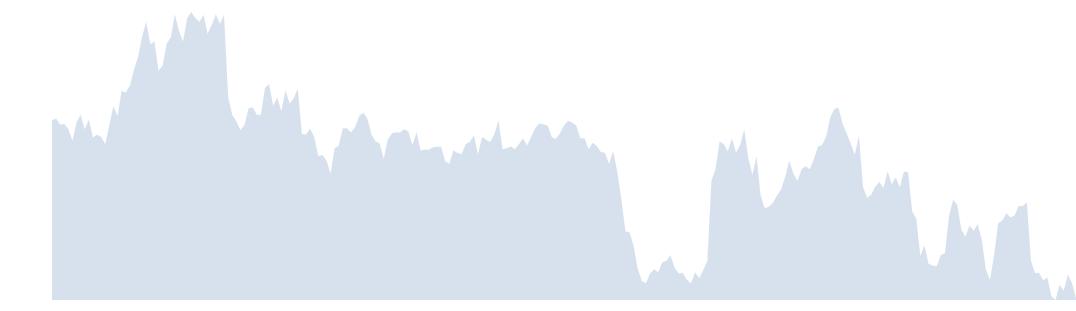
Johnson & Johnson

JNJ



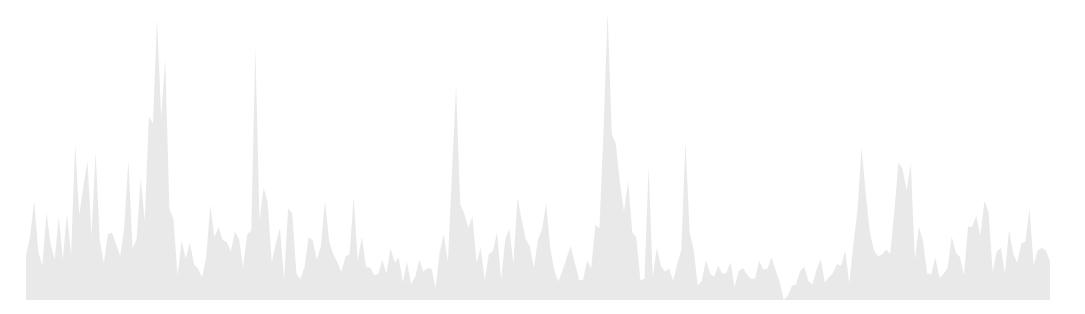
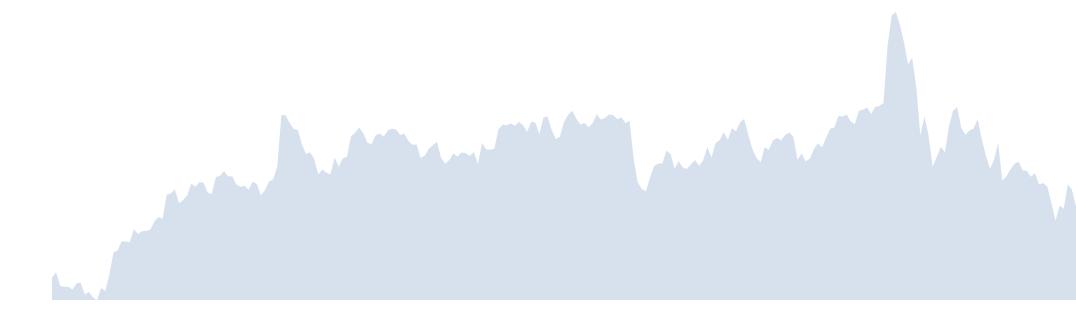
Roche

RHHBY



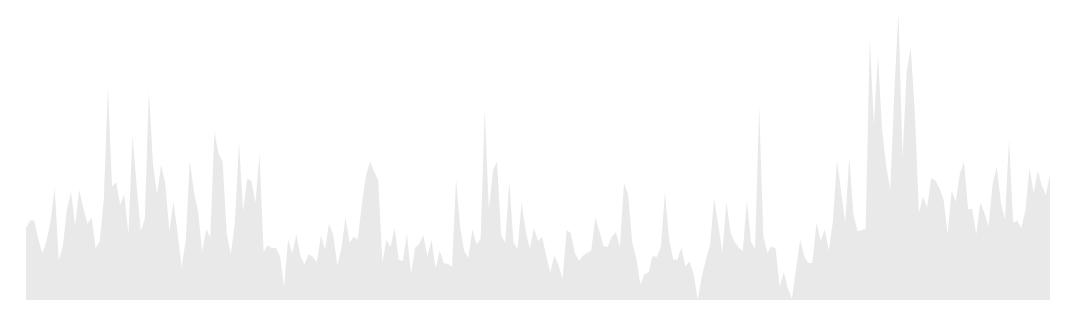
Novartis

NVS



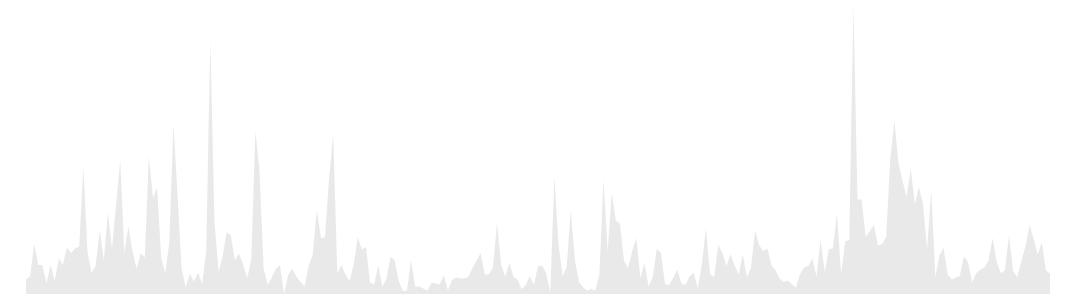
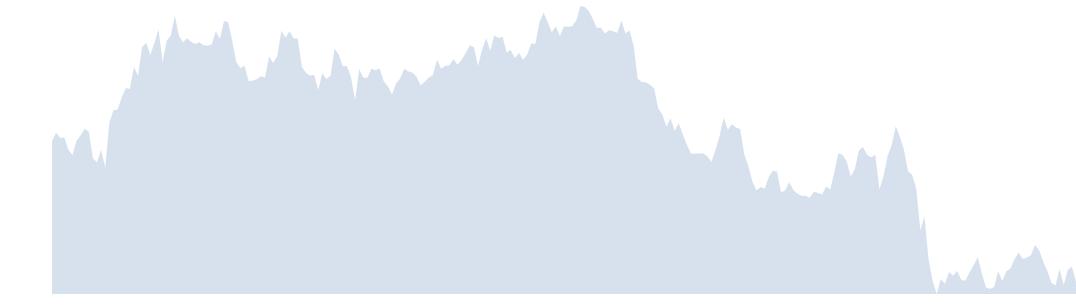
Pfizer

PFE



Sanofi

SNY



# What is it about Go?

fmt

func

io.Writer

io.Reader

net/http

encoding/xml

encoding/json

cgo

# The Community

gofpdf

From: Russ Cox  
Subject: Re: [go-nuts] Visualizing Random Number Generators...  
Date: March 5, 2010 1:14:44 EST  
To: ajstarks <ajstarks@gmail.com>

---

are you going to share the library  
or just tease us with pictures? ;-)

Thompson wanted to create a comfortable computing environment constructed according to his own design, using whatever means were available.

Dennis M. Ritchie, “The Development of the C Language”

Go is not the product of a Whiggish development process. We were just trying to get something that worked for us.

Rob Pike, "Origin of Go's interface design", golang-nuts

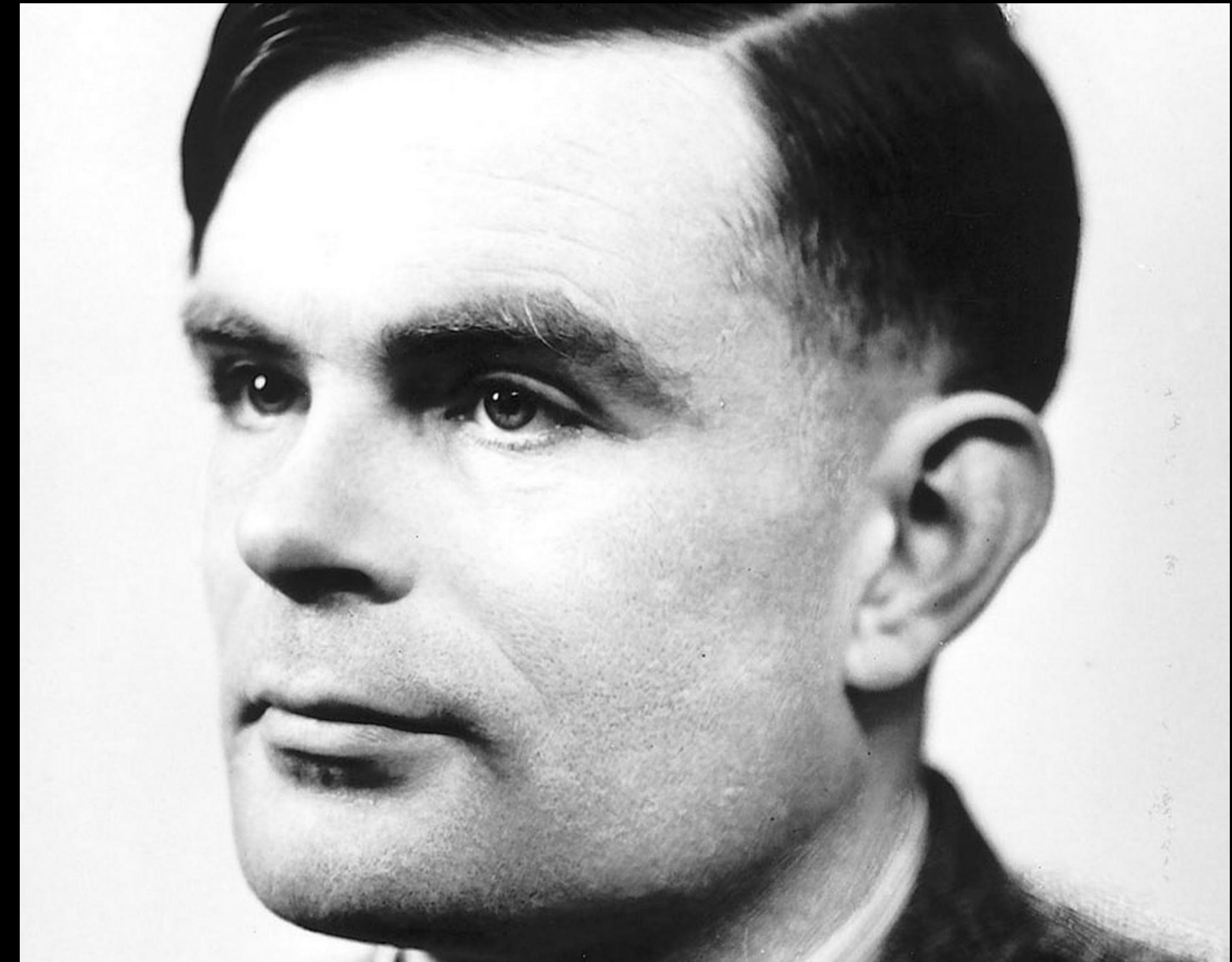
# Making Tools

# Fun

Reducing the distance from  
the idea to the picture



Picasso



Turing

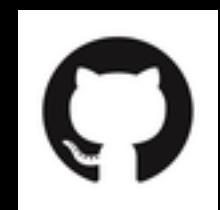
# Thank you



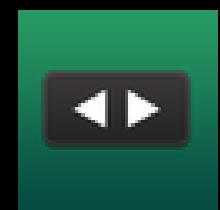
@ajstarks



ajstarks@gmail.com



github.com/ajstarks



speakerdeck.com/ajstarks



flickr.com/photos/ajstarks