

The other side of Go

Programming Pictures

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Go is great in the back end



But sometimes it's about the picture

API Design

Client Program Design

Visual Design and Relationships

Why Go?



Element

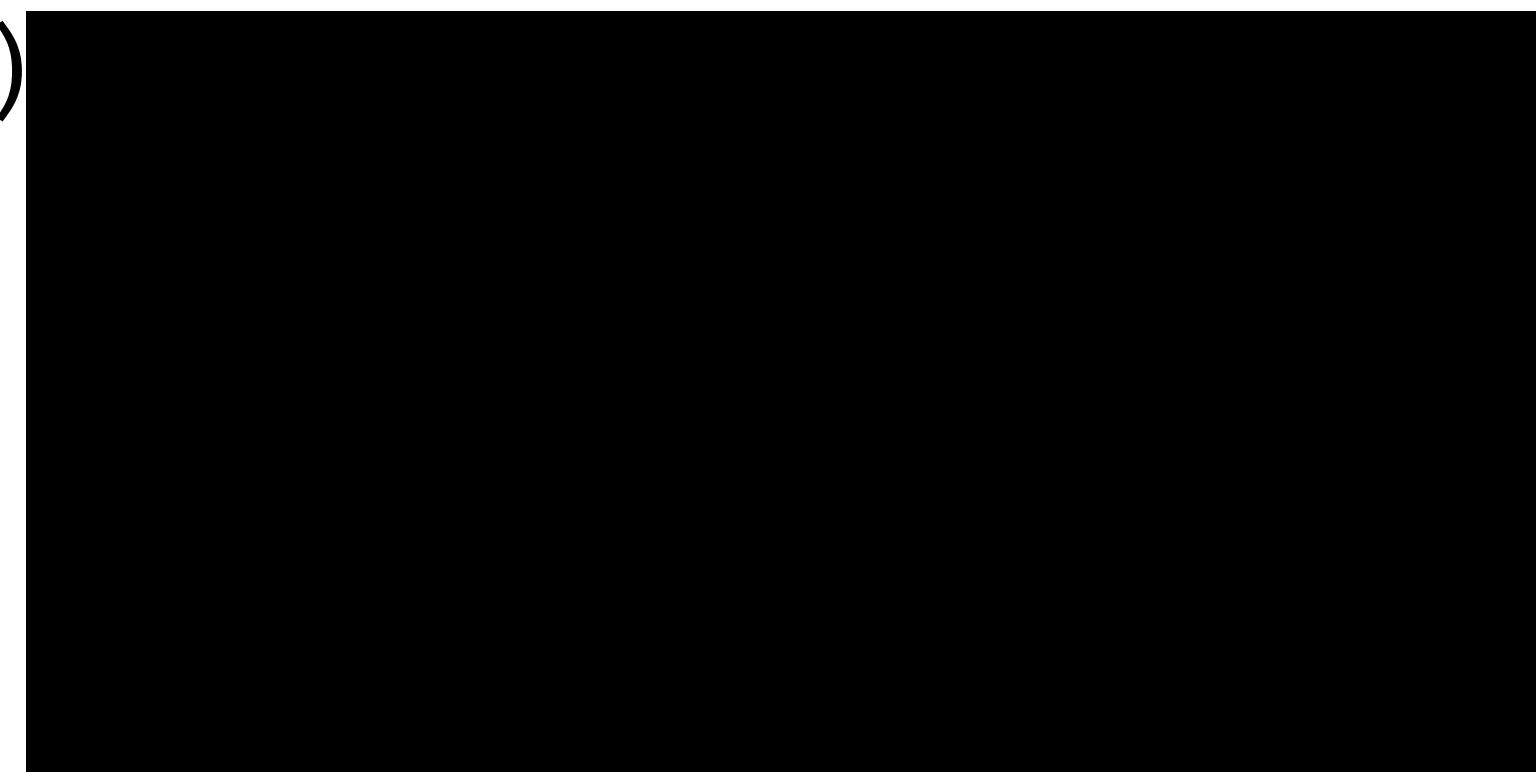
Rect

Arguments

(100,200,250,125)

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

(100, 200)



125

250

Element

Rect

Arguments

(100,200,250,125,

CSS Style

"fill:gray;stroke:blue")

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

(100, 200)



125

250

Element

Rect

Arguments

(100,200,250,125,
`id="box"`, `fill="gray"`, `stroke="blue"`)

Attributes

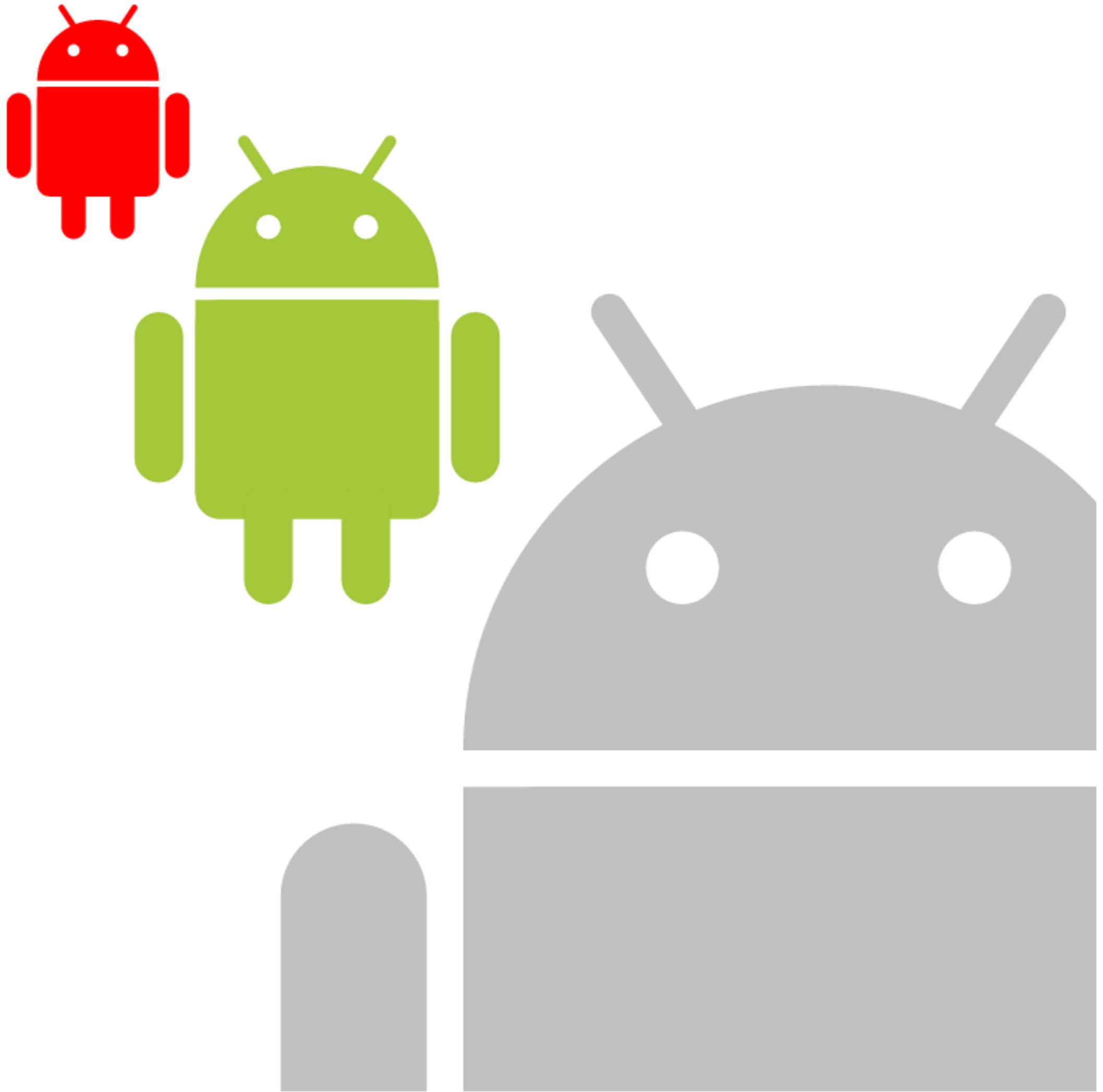
```
<rect x="100" y="200" width="250" height="125"  
id="box" fill="gray" stroke="blue"/>
```

(100, 200)



125

250



Scale



Roundrect



fill:rgb(164,198,57)

Line

Circle

Arc

Line

Rect

```
package main

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

func main() {
    width := 960
    height := 540
    canvas := svg.New(os.Stdout)
    canvas.Start(width, height)
    canvas.Rect(0, 0, width, height, "fill:black")
    canvas.Circle(width/2, height, width/2, "fill:rgb(44,77,232)")
    canvas.Text(width/2, height/2, "hello, world",
        "fill:white;font-size:60pt;font-family:serif;text-anchor:middle")
    canvas.End()
}
```



```

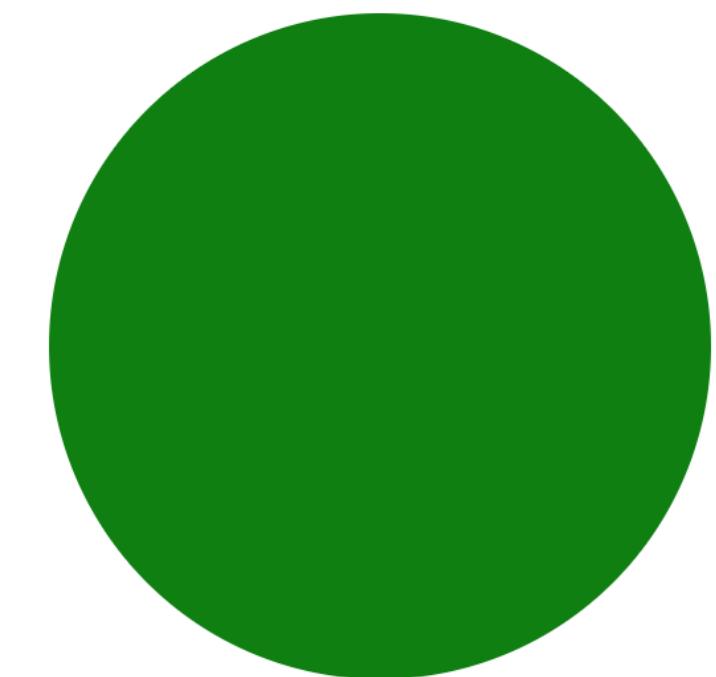
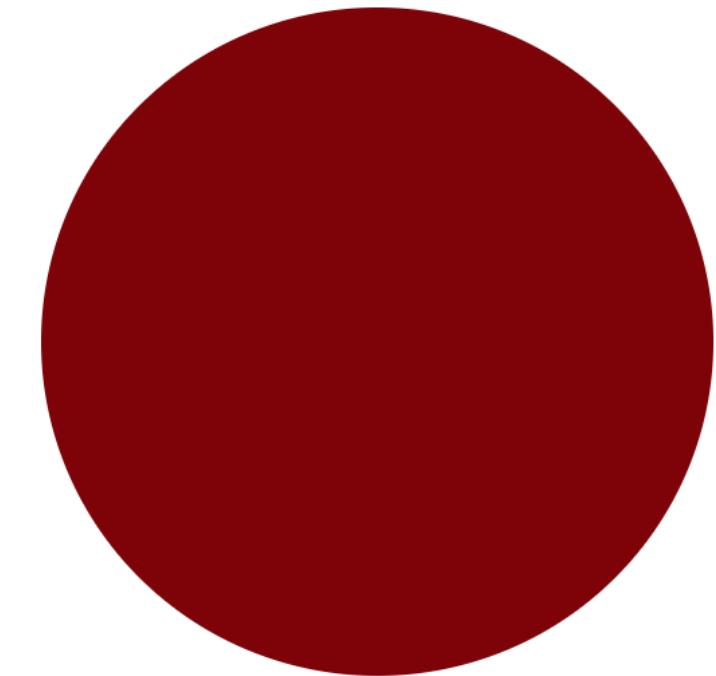
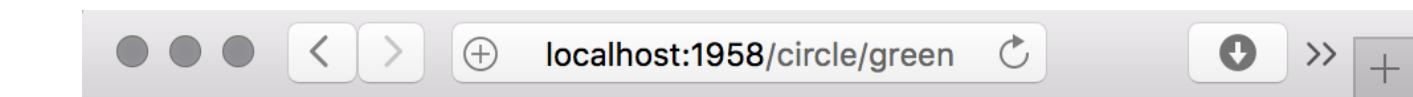
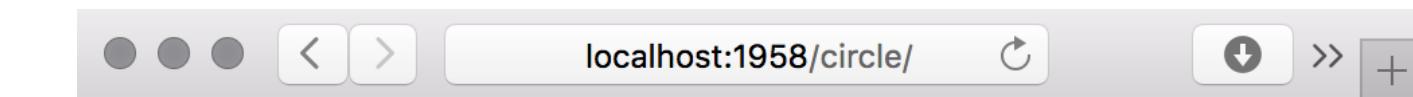
const defaultstyle = "fill:rgb(127,0,0)"

func main() {
    http.Handle("/circle/", http.HandlerFunc(circle))
    err := http.ListenAndServe("localhost:1958", nil)
    if err != nil {
        log.Println("ListenAndServe:", err)
    }
}

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
}

```



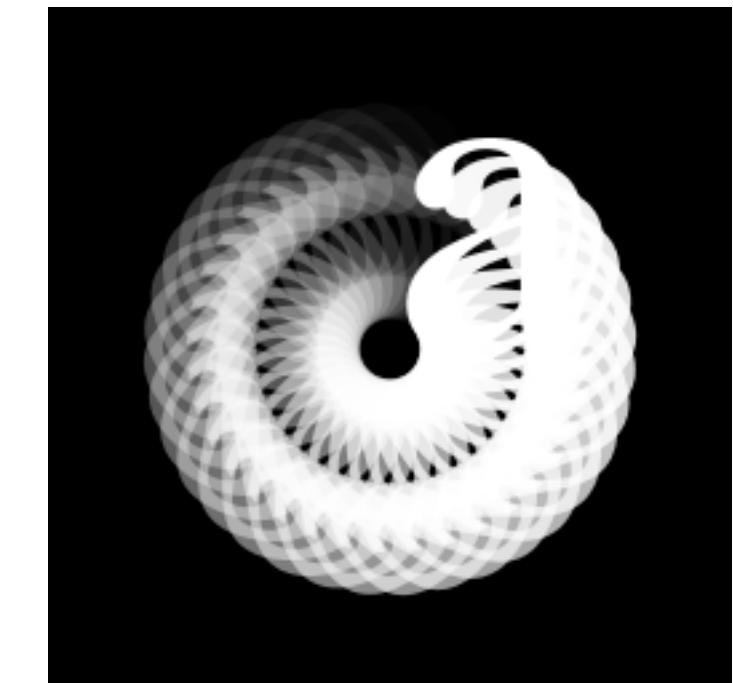
<http://ajstarks.org:1958/{thing}/>



clock



funnel



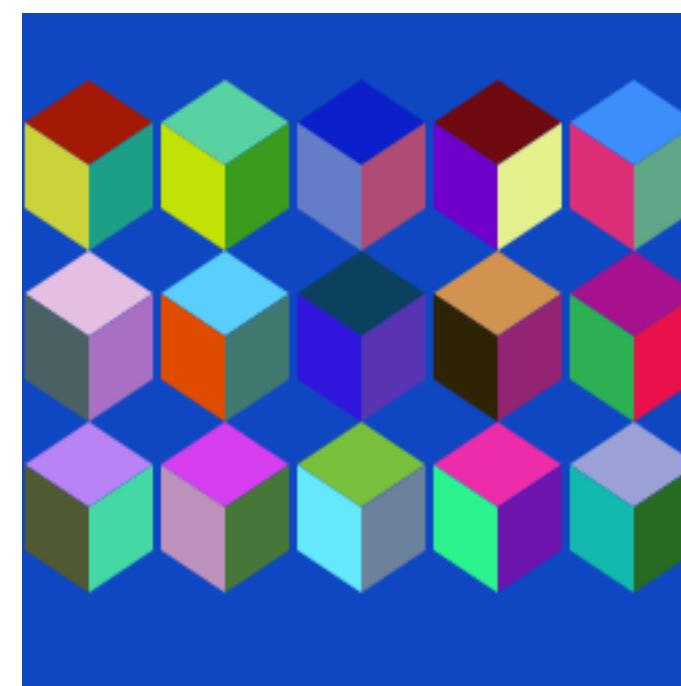
rotext



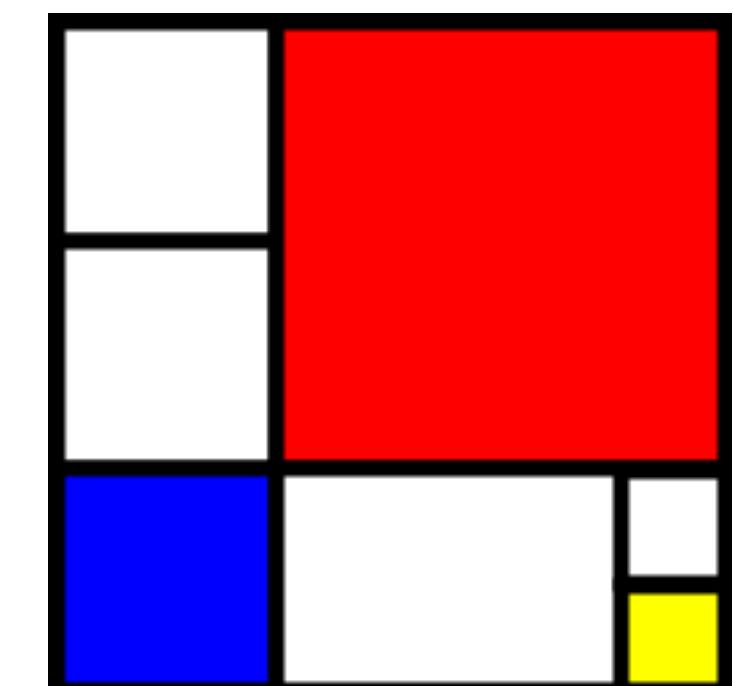
flower



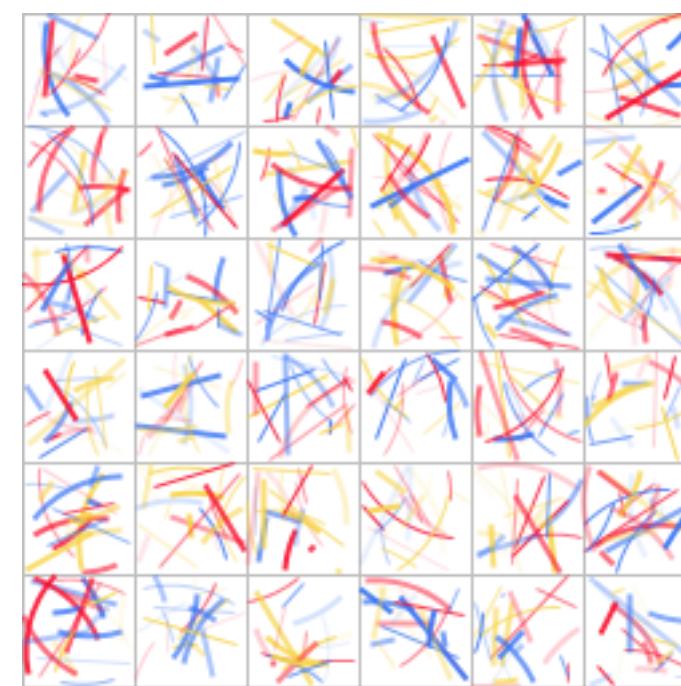
rshape



cube



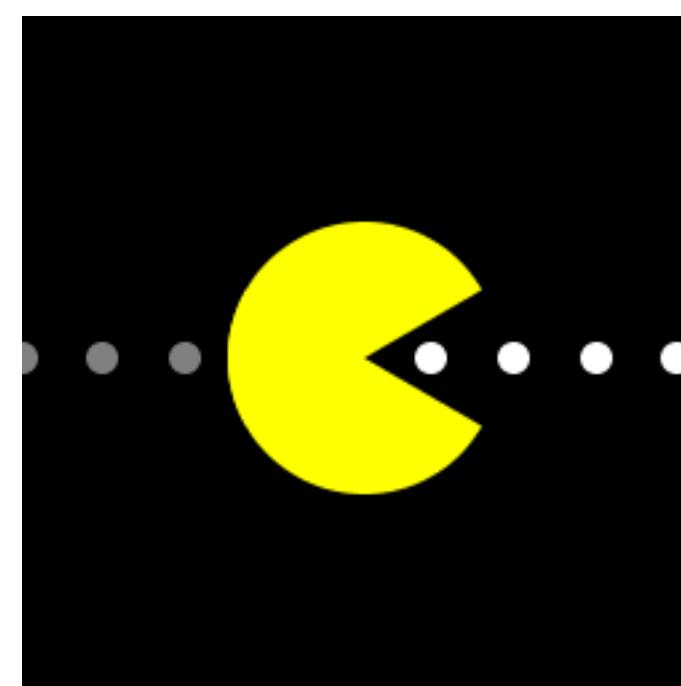
mondrian



lewitt



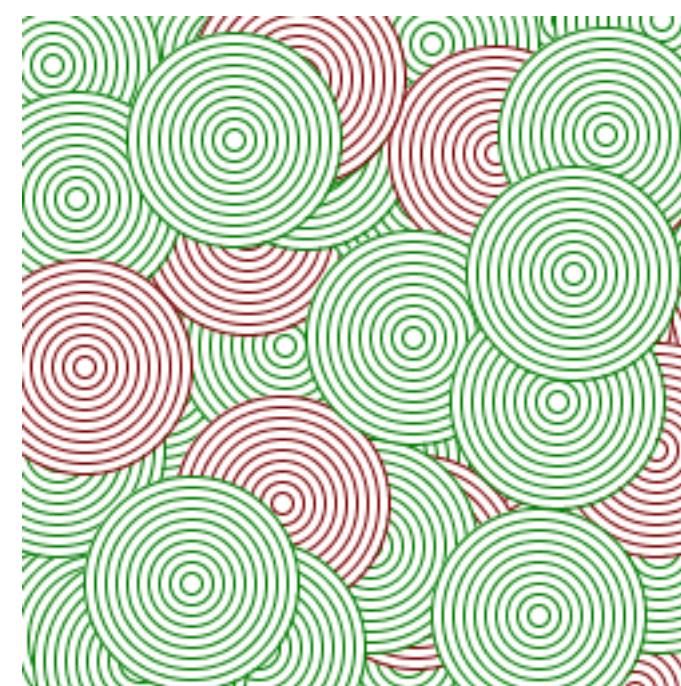
face



pacman

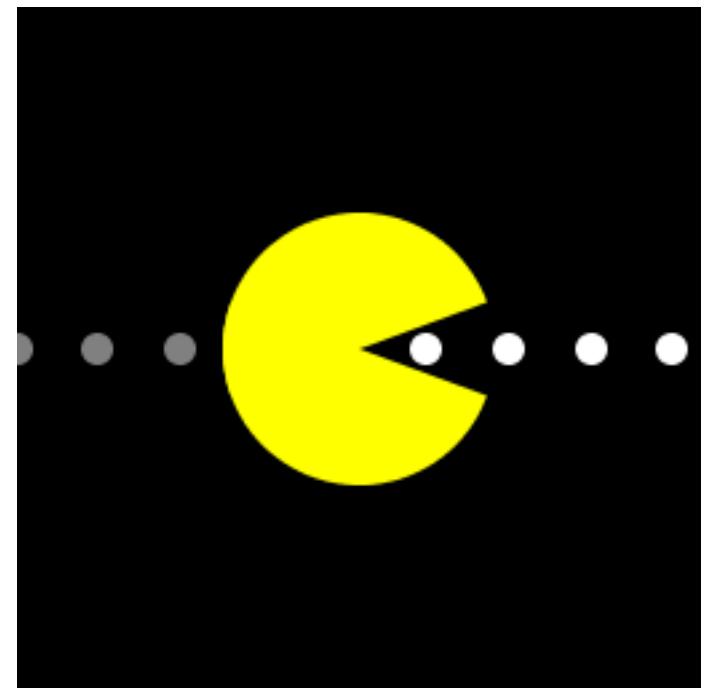


tux

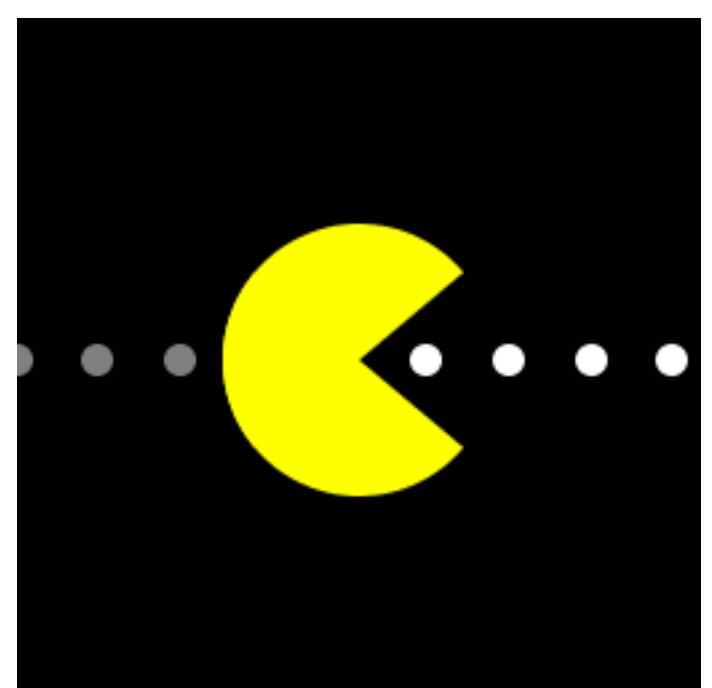


concentric

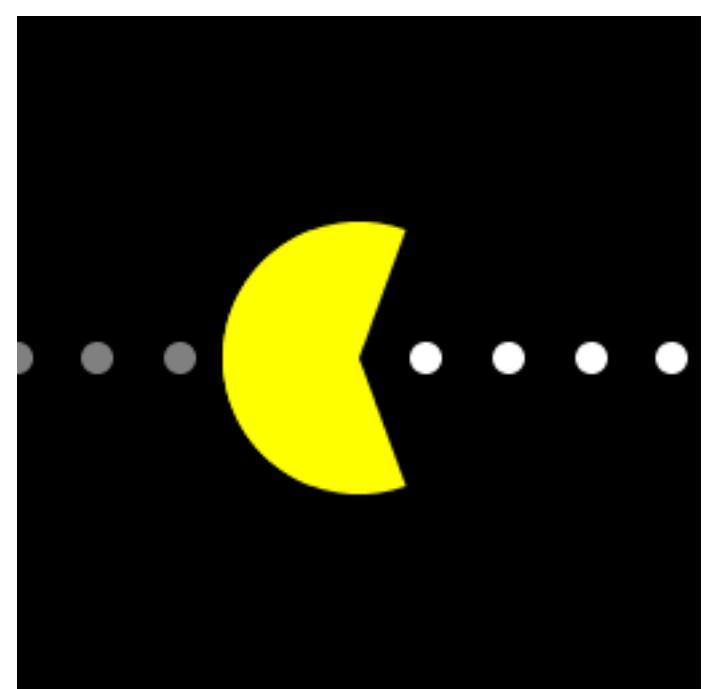
/pacman/?angle=20



/pacman/?angle=40



/pacman/?angle=70

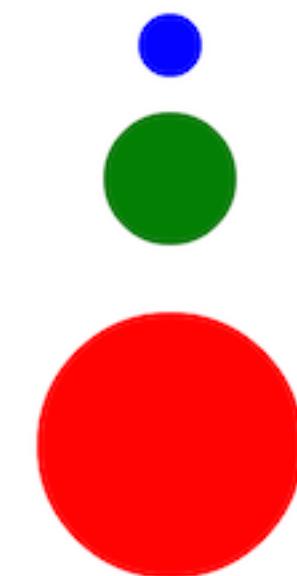


Read/Parse/Draw Pattern

Data



Picture



Little:This is small/blue

Med:This is medium/green

Big:This is large/red

```
<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>
```

Imports

```
package main
import (
    "encoding/xml"
    "flag"
    "fmt"
    "io"
    "os"
    "github.com/ajstarks/svggo"
)
```

Read the Input

```
func dothing(location string) {
    f, err := os.Open(location)
    if err != nil {
        fmt.Fprintf(os.Stderr, "%v\n", err)
        return
    }
    defer f.Close()
    readthing(f)
}
```

Data Structures

```
type Thing struct {
    Top int `xml:"top,attr"`
    Left int `xml:"left,attr"`
    Sep int `xml:"sep,attr"`
    Item []item `xml:"item"`
}

type item struct {
    Width int `xml:"width,attr"`
    Height int `xml:"height,attr"`
    Name string `xml:"name,attr"`
    Color string `xml:"color,attr"`
    Text string `xml:",chardata"`
}
```

Parse and Load

```
func readthing(r io.Reader) {
    var t Thing
    err := xml.NewDecoder(r).Decode(&t)
    if err != nil {
        fmt.Fprintf(os.Stderr, "%v\n", err)
        return
    }
    drawthing(t)
}
```

Flags and Main

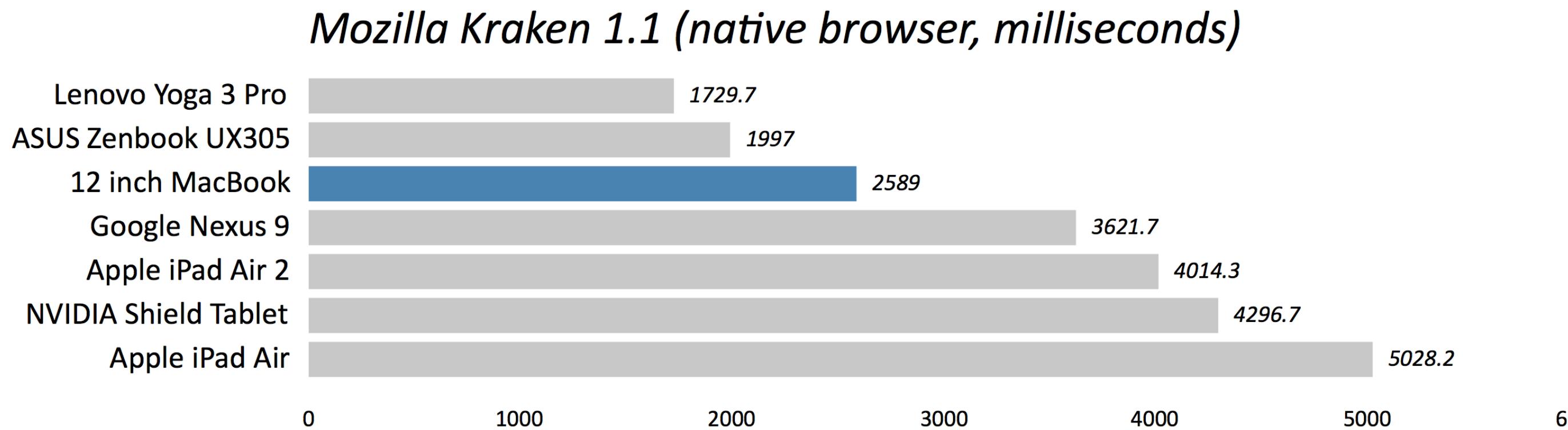
```
var (
    width = flag.Int("w", 1024, "width")
    height = flag.Int("h", 768, "height")
    canvas = svg.New(os.Stdout)
)

func main() {
    flag.Parse()
    for _, f := range flag.Args() {
        canvas.Start(*width, *height)
        dothing(f)
        canvas.End()
    }
}
```

Draw

```
func drawthing(t Thing) {
    x := t.Left
    y := t.Top
    thingfmt := "font-size:%dpx;fill:%s"
    tfmt := "%s:%s/%s"
    for _, v := range t.Item {
        s := fmt.Sprintf(thingfmt,
                         v.Width/2, v.Color)
        canvas.Circle(x, y, v.Height/4,
                      "fill:"+v.Color)
        canvas.Text(x+t.Sep, y,
                    fmt.Sprintf(tfmt,
                               v.Name, v.Text, v.Color, s))
        y += v.Height
    }
}
```

```
<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>
```



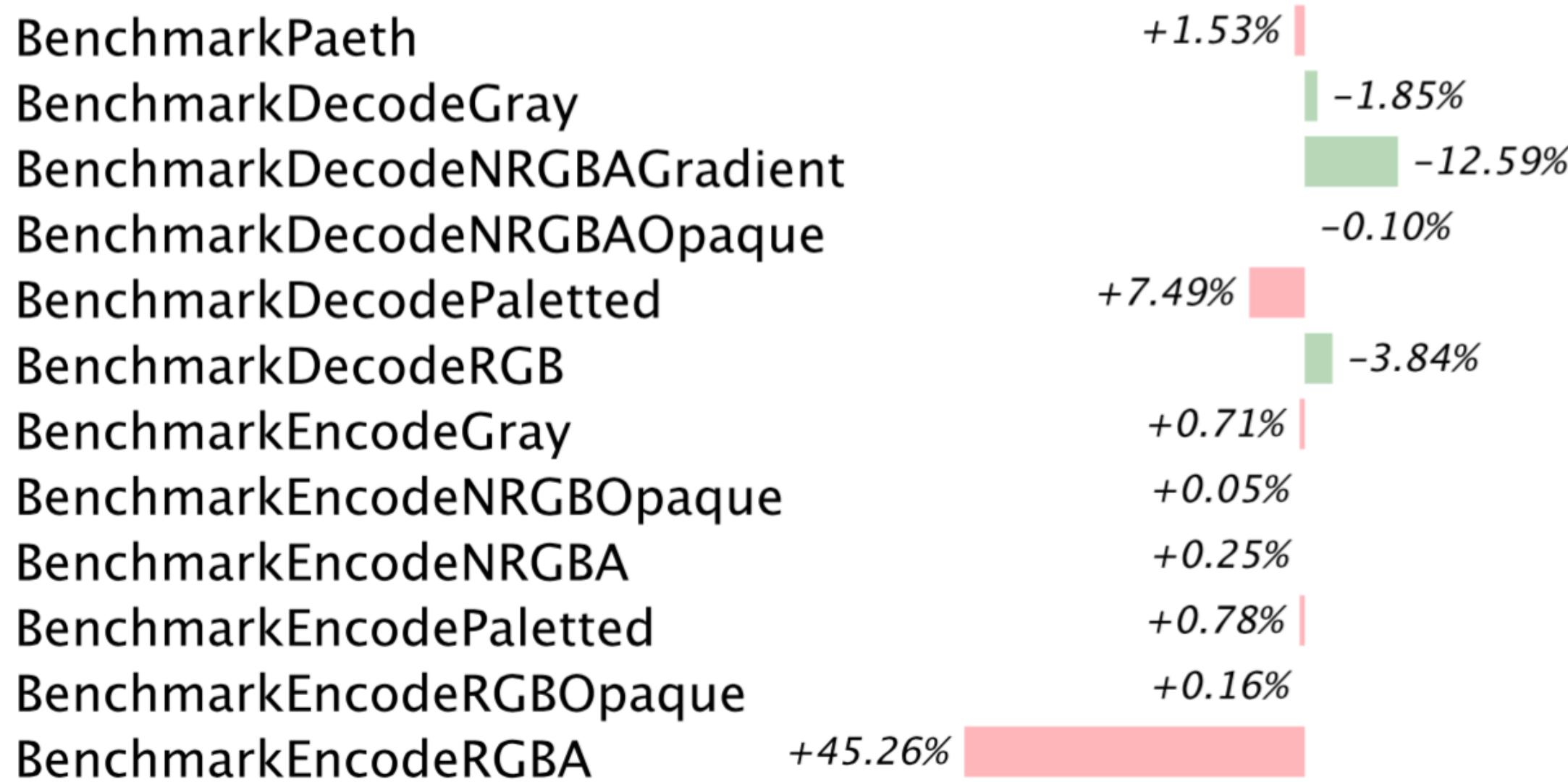
2015 MacBook Benchmarks

Source: AnandTech, April 14, 2015

SVGo Clients

benchpng.txt

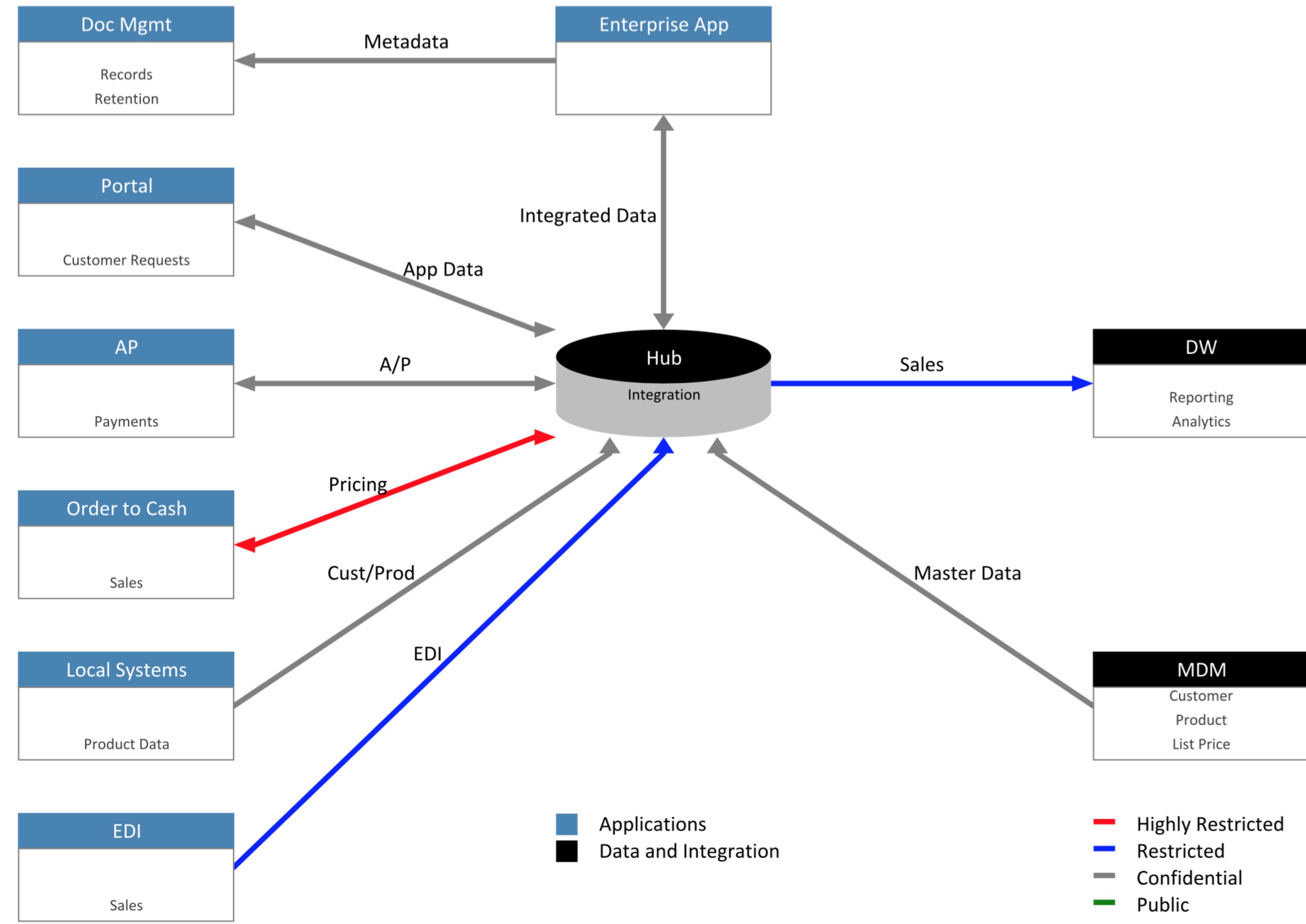
image/png package: Go 1.3 vs Go 1.4

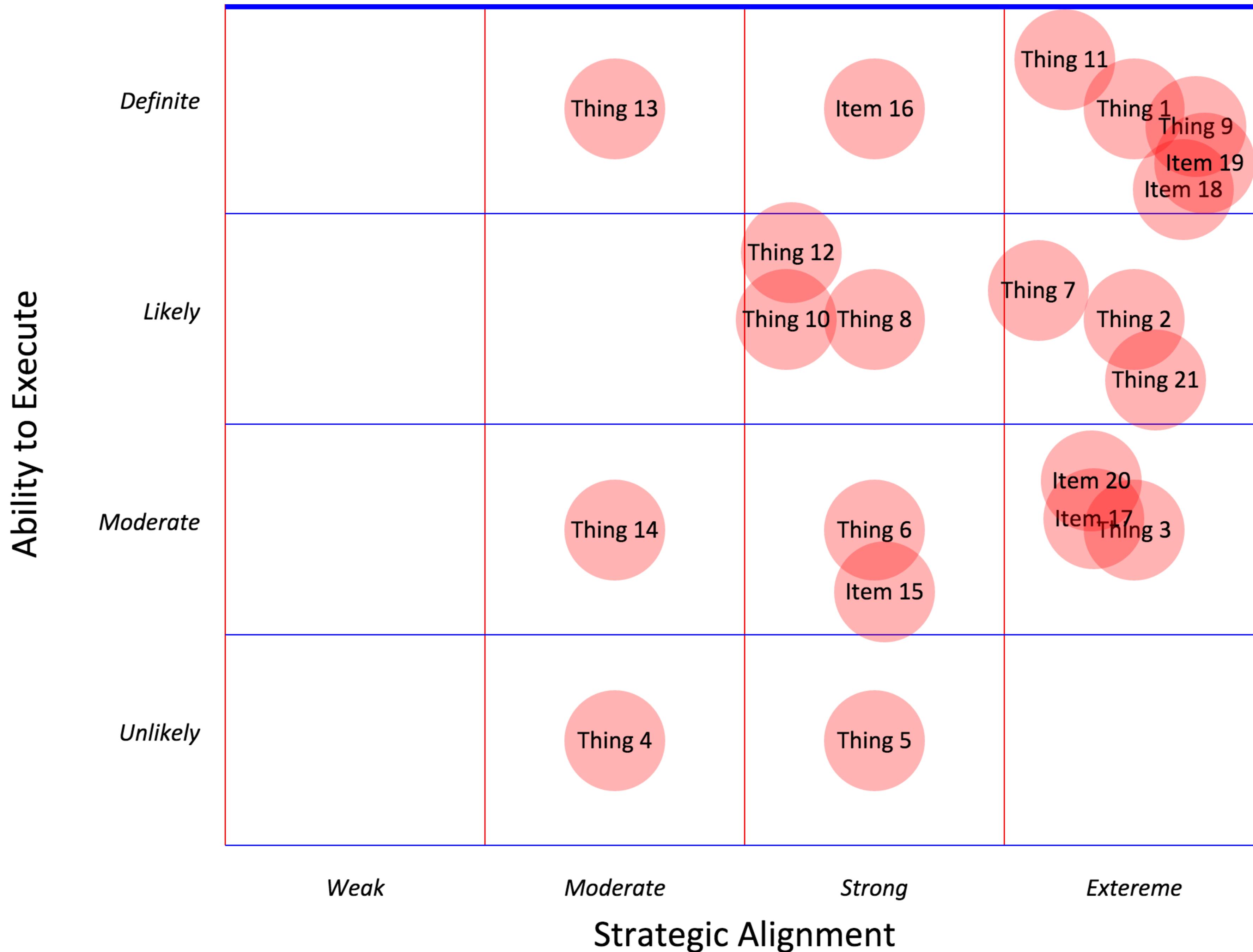




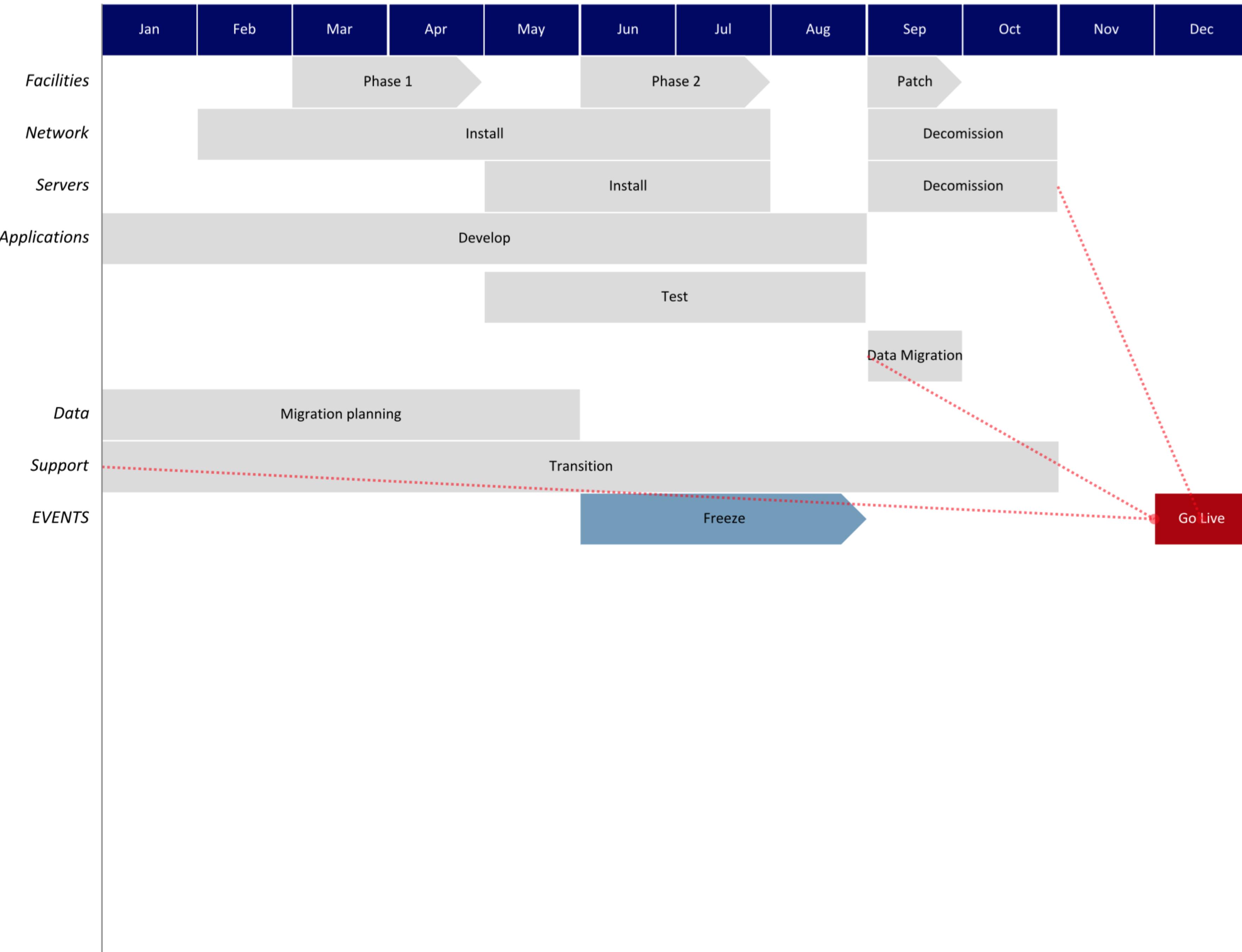
Sample Bullet Graph

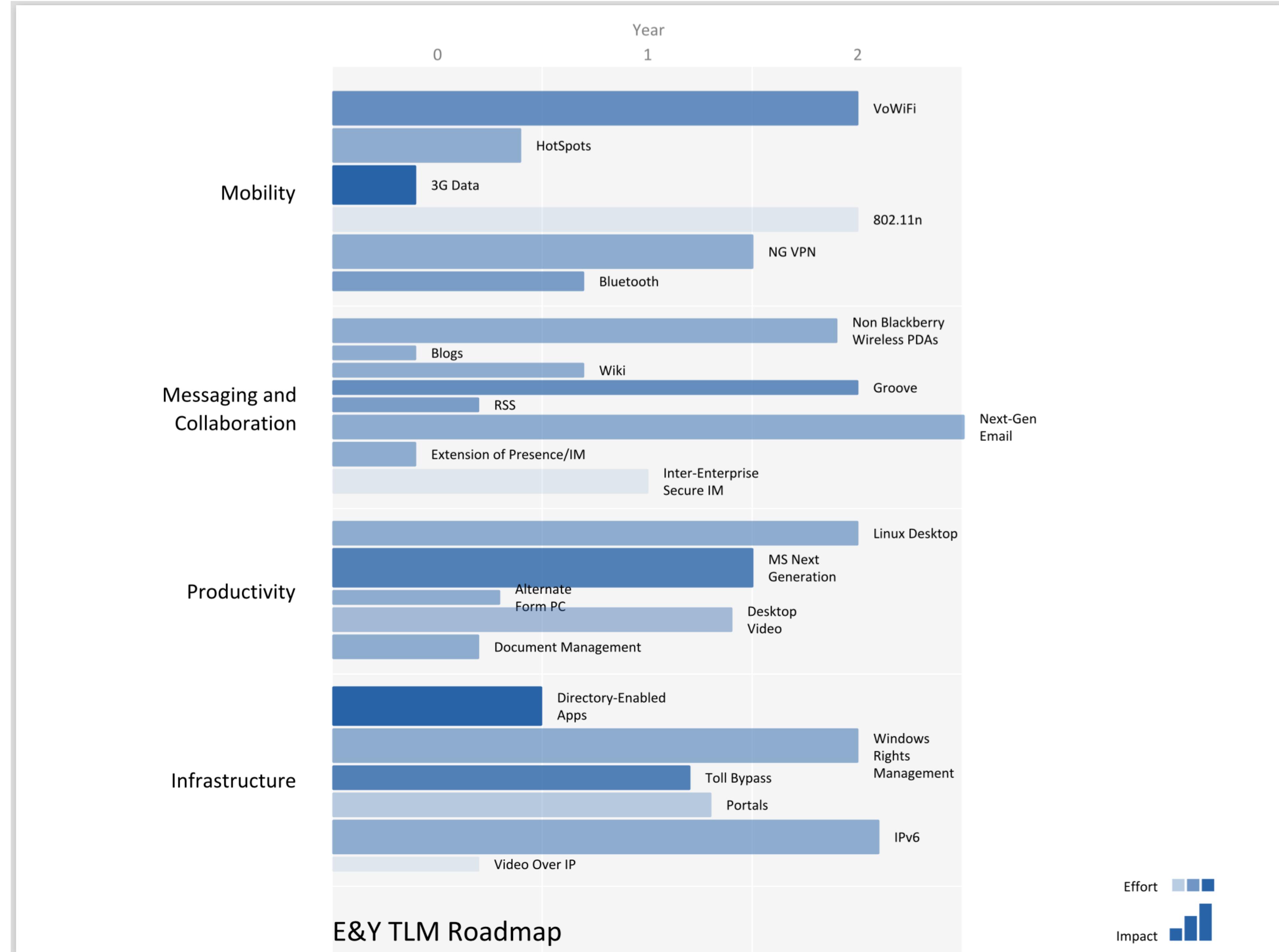
The bullet graph features a single, primary measure (for example, current year-to-date revenue) compares that measure to one or more other measures to enrich its meaning, for example, compared to a target), and displays it in the context of qualitative ranges of performance, such as poor, satisfactory,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





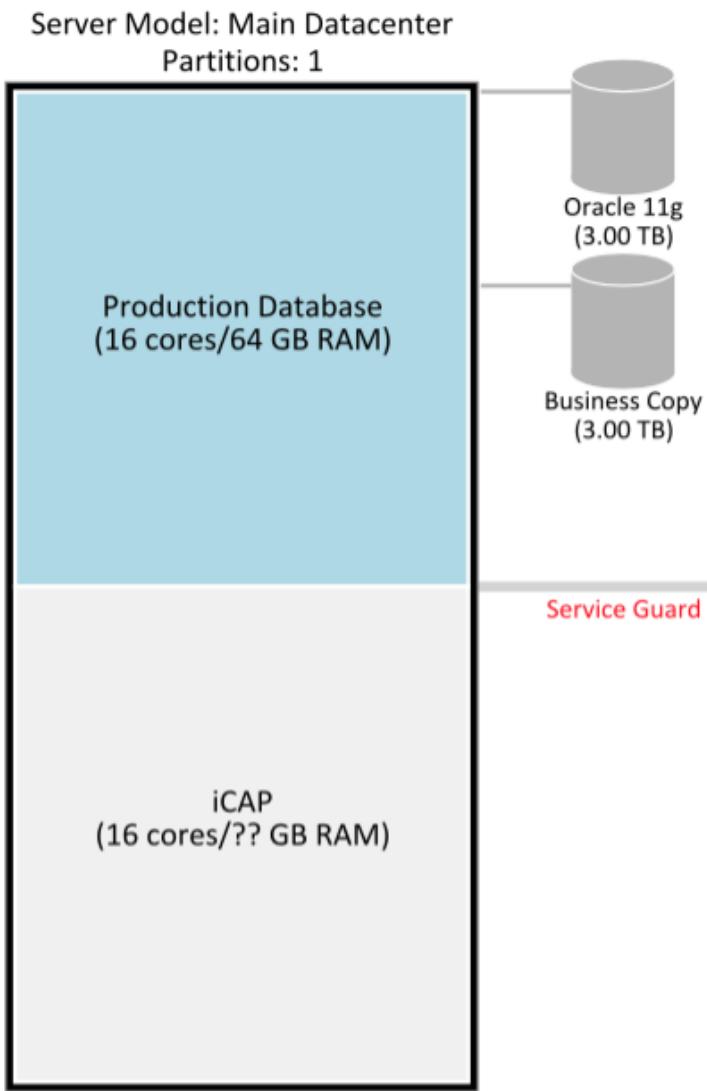
PLANNING TO PLAN



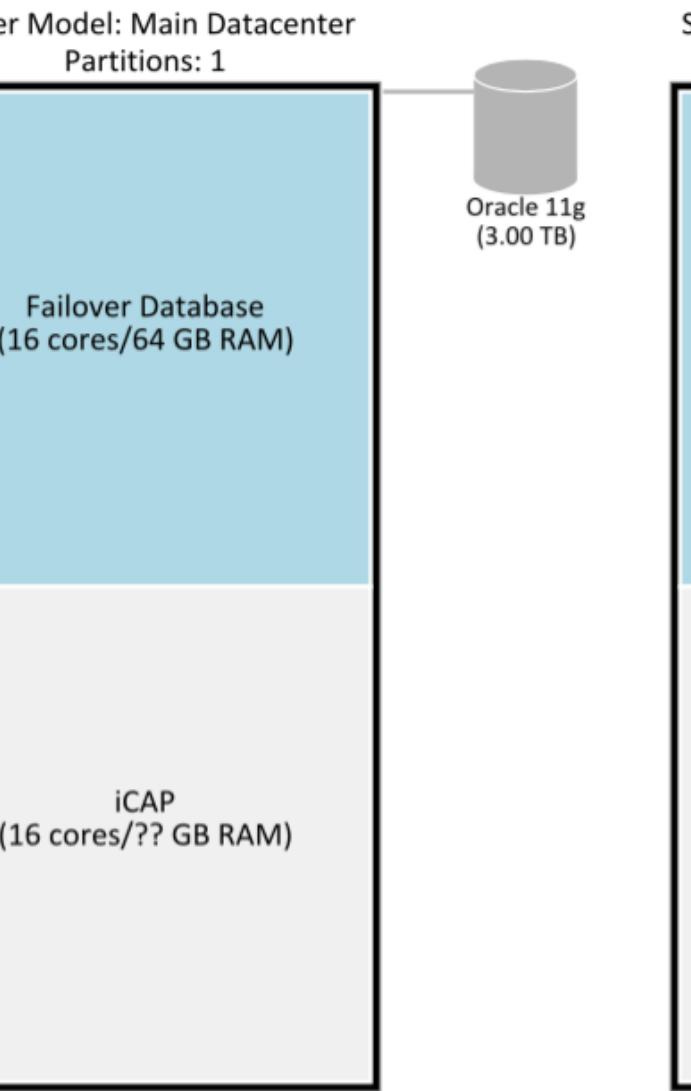




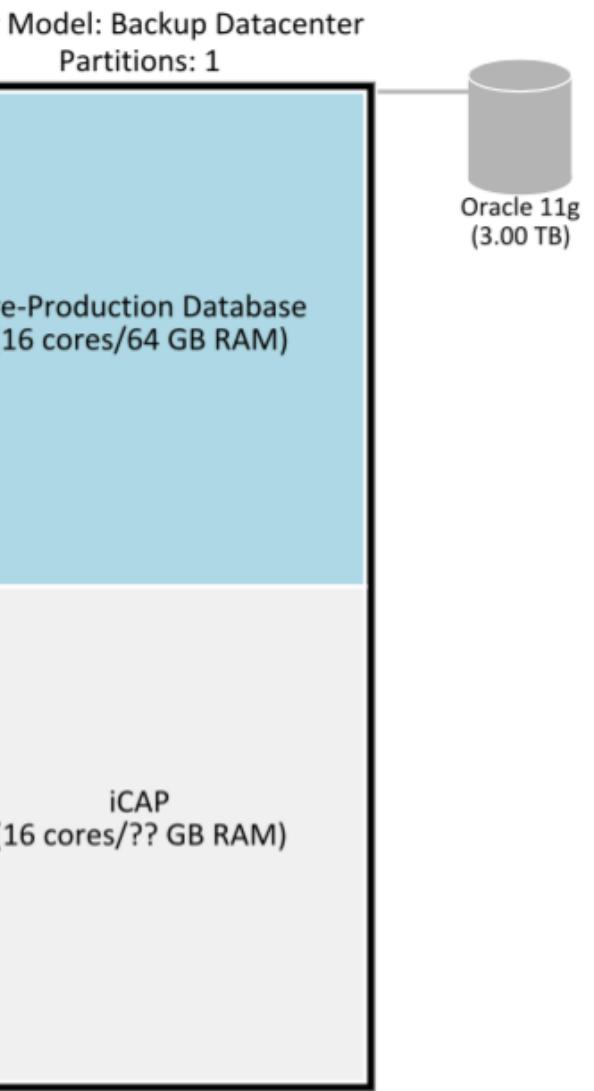
PRODUCTION



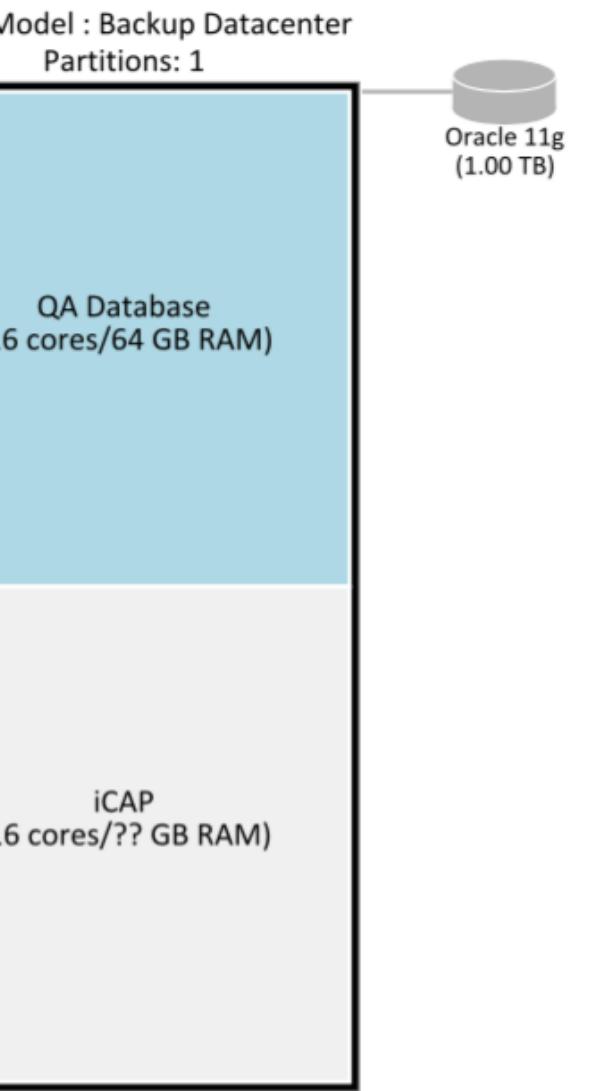
FAILOVER



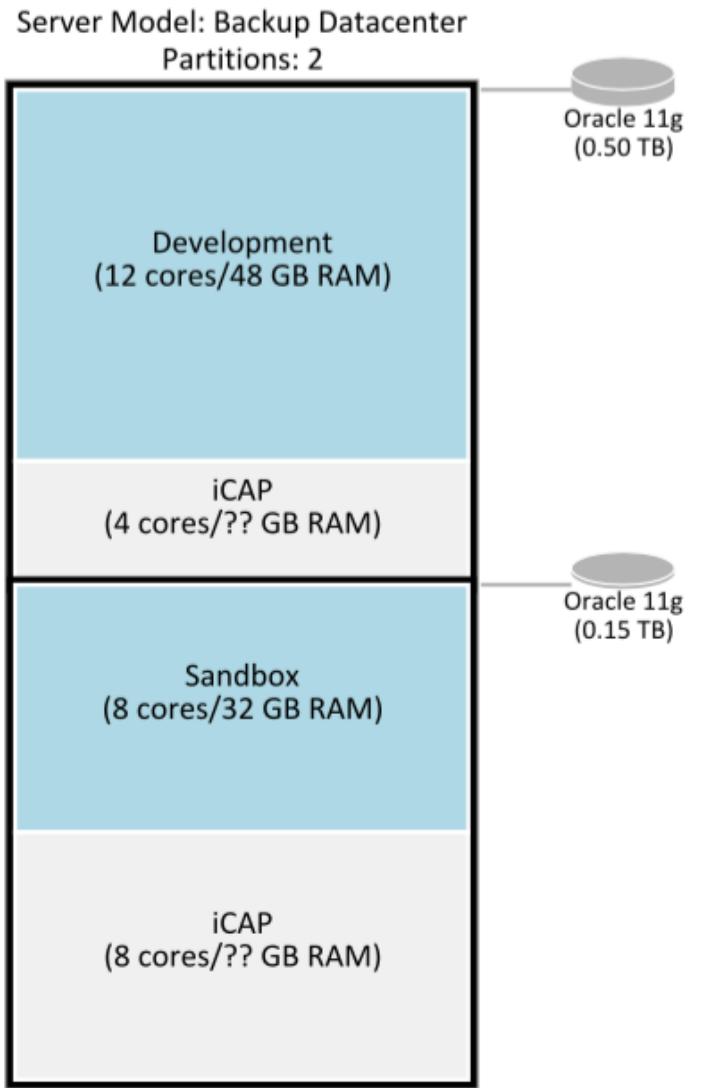
PRE-PROD



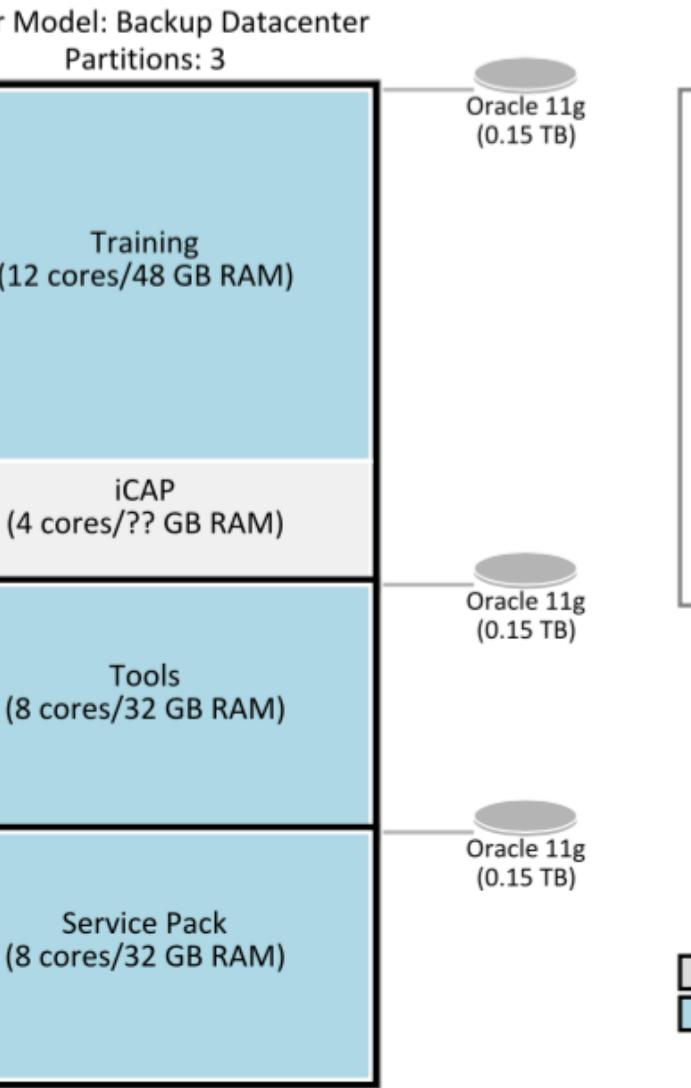
QA



DEV



TRAINING/TOOLS



Servers	6
Clusters	1
Partitions	9
Active RAM (GB)	448
Storage (TB)	14.10
Active Cores	112
iCap Cores	80
Total Cores	192

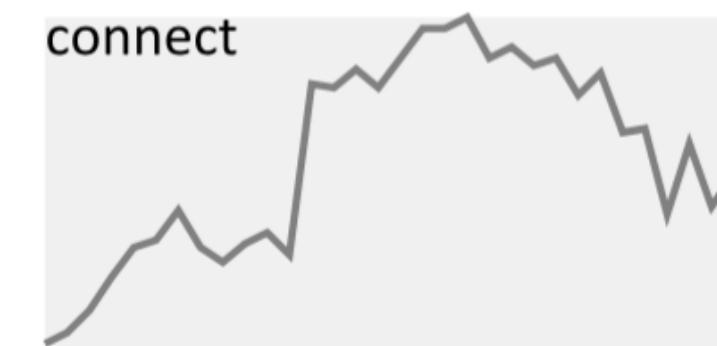
□ Active
■ Future Expansion

Server Layout

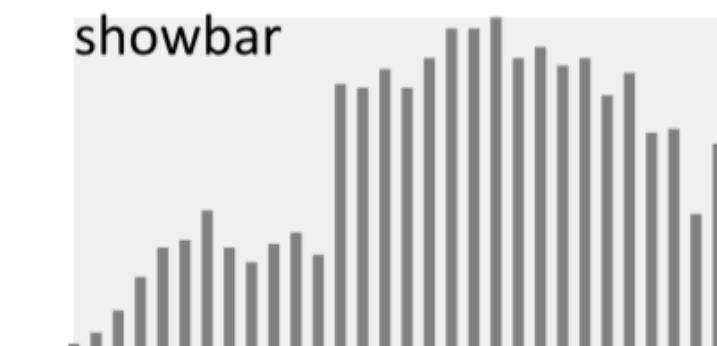
showbg



connect



showbar



area



showdot



showx



623.0
589.8
556.5
523.2
490.0
showy



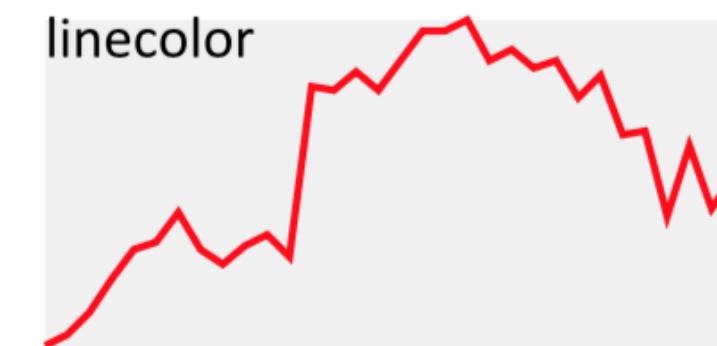
test.d



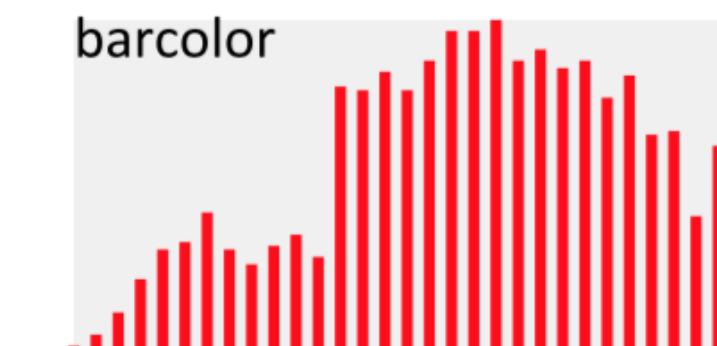
bgcolor



linecolor



barcolor



hcolor



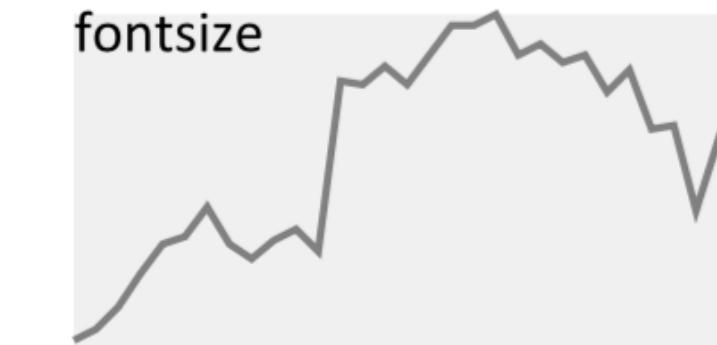
dotcolor



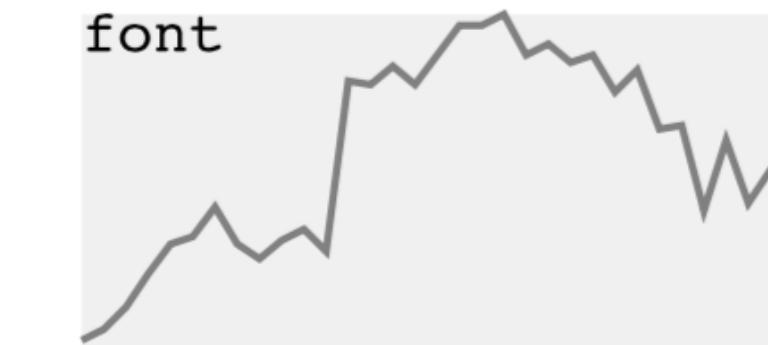
labelcolor



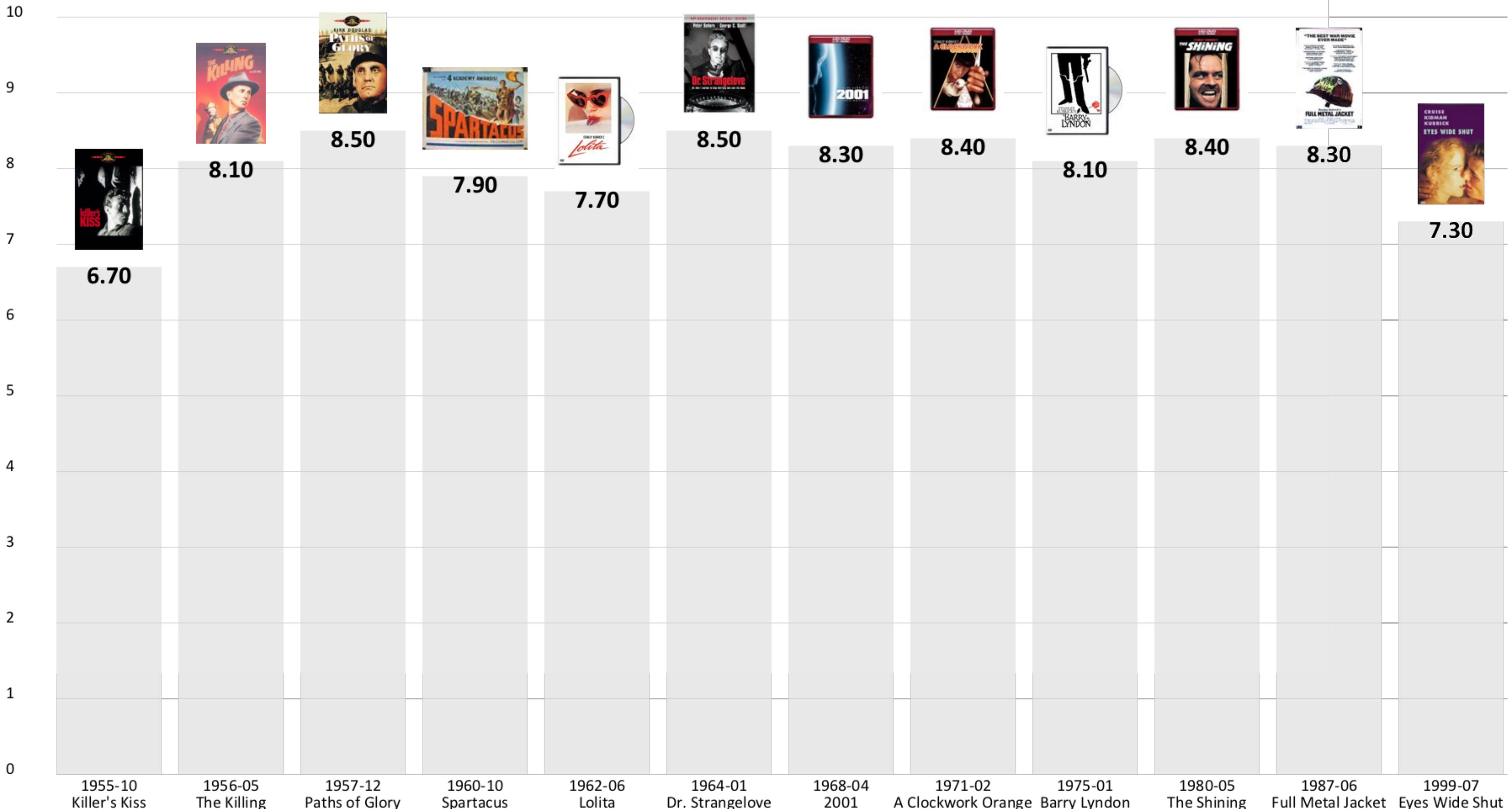
fontsize



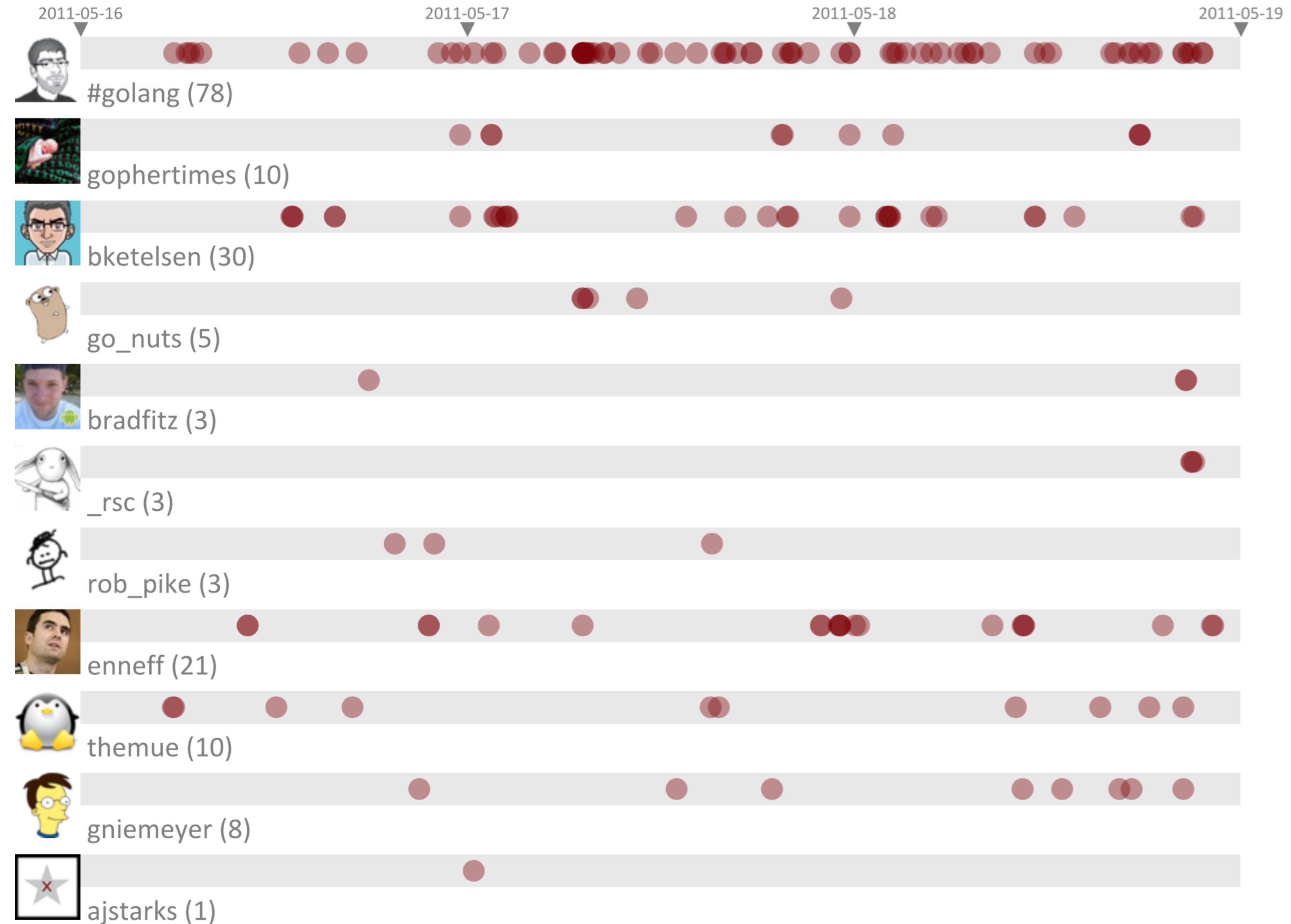
font



IMDB Ratings of Kubrick Films



Twitter Update Frequency



JONES

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

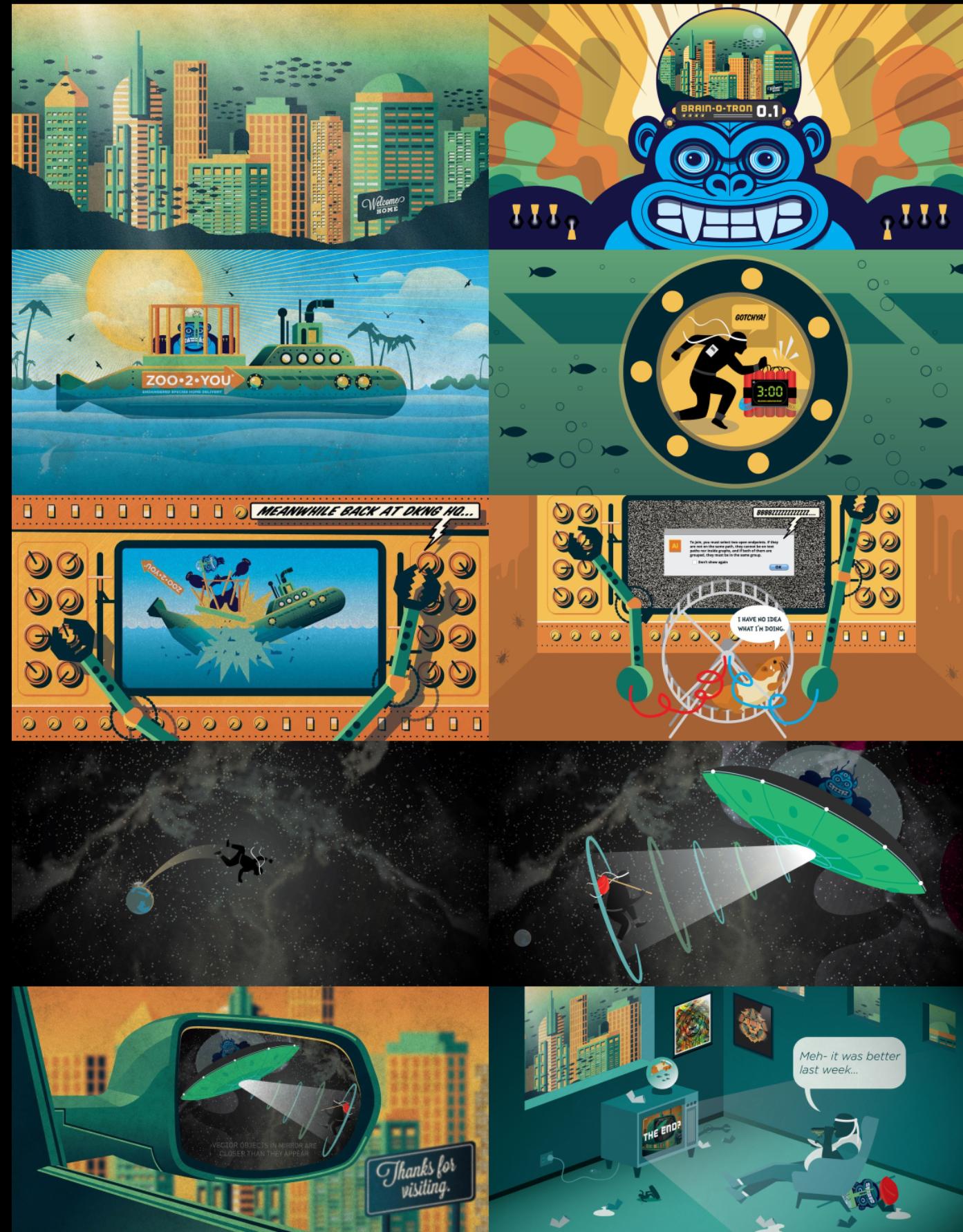
MONTIEL



DKNG

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

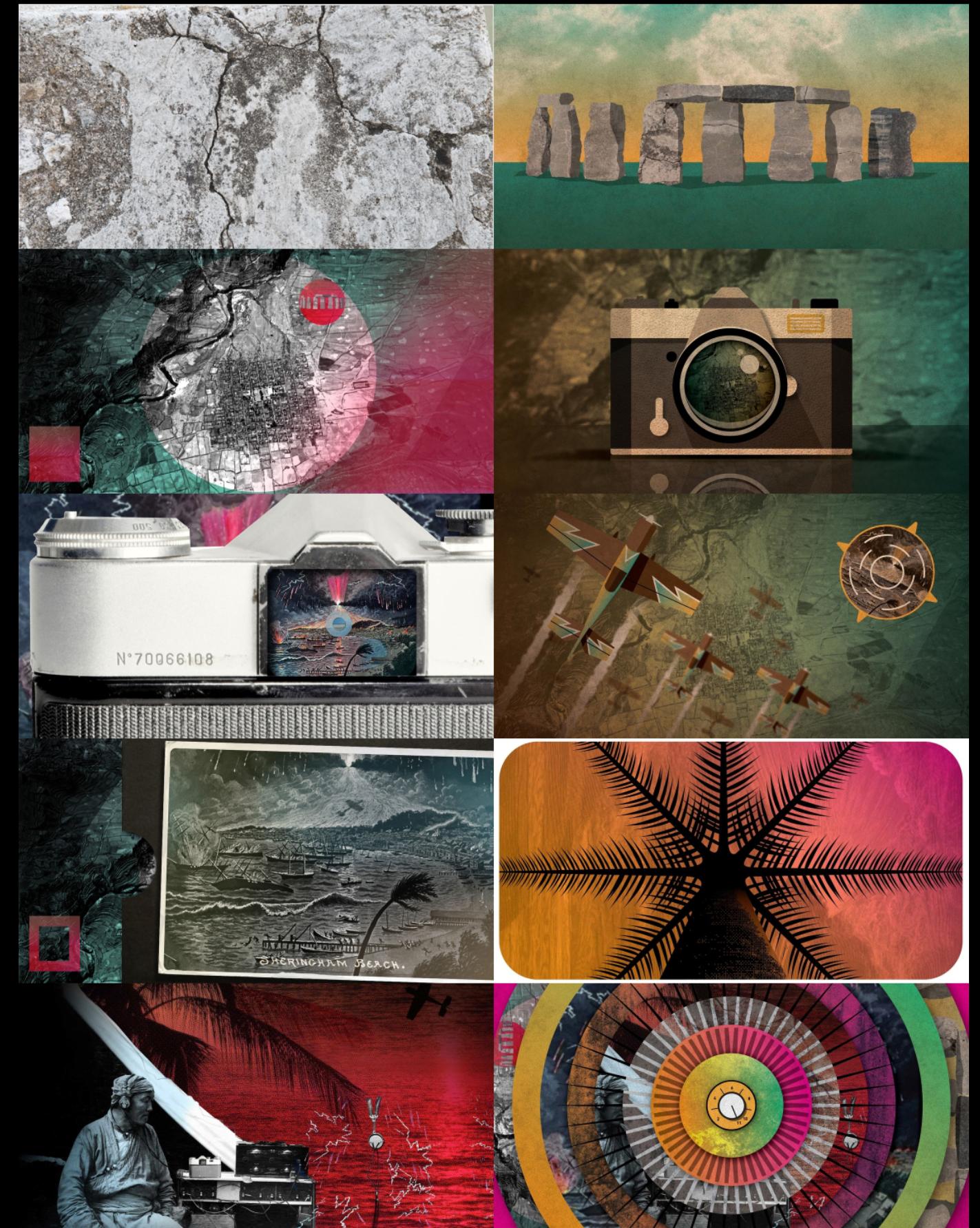
DDL



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



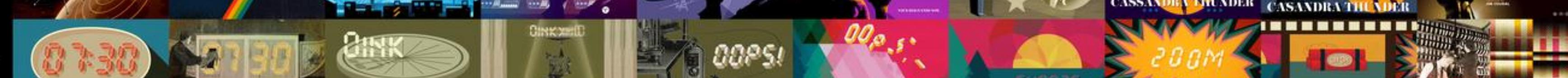
ANDERSON
DKNG



TAYLOR
WHITE



RAJKUMAR
ANDERSON



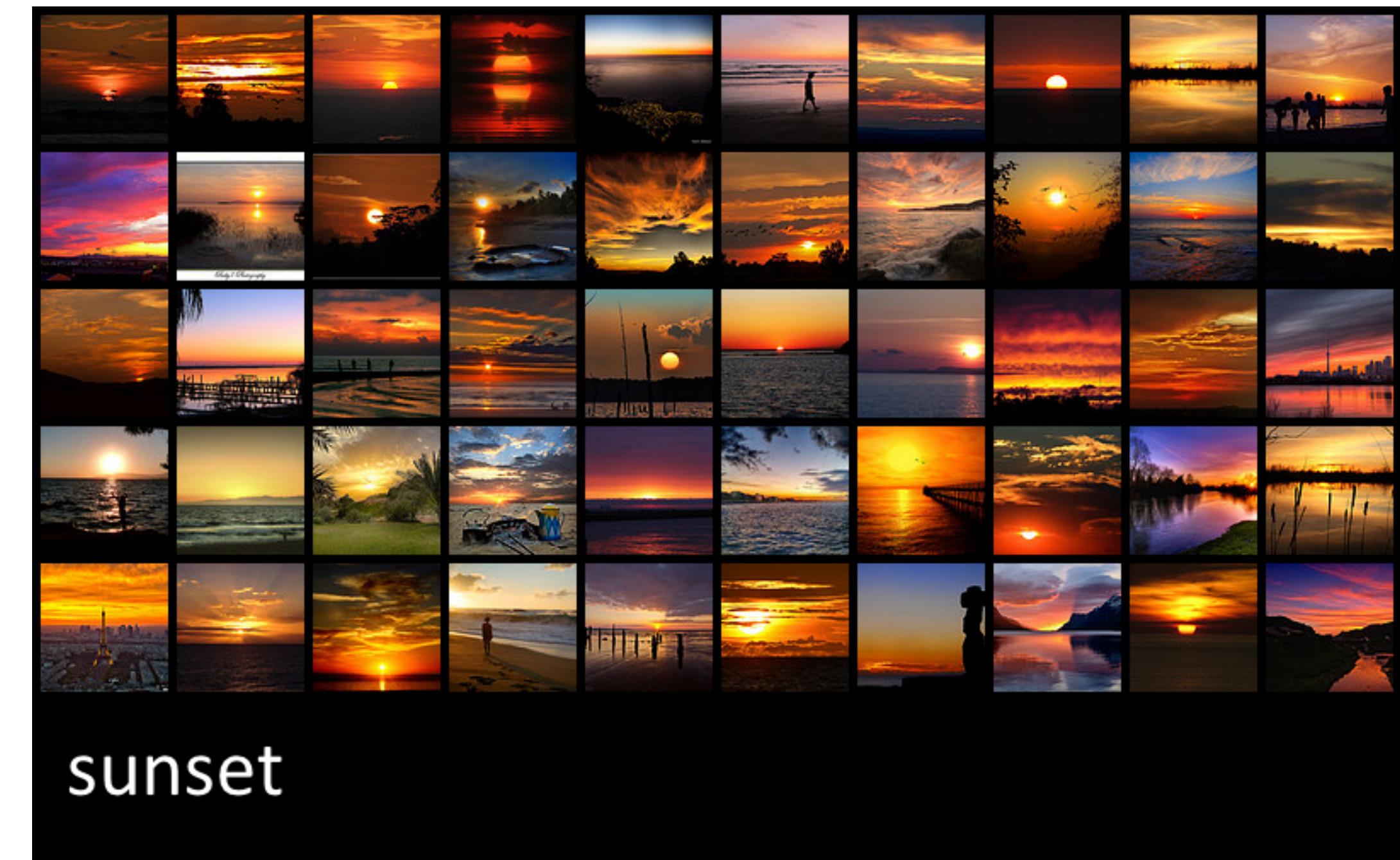
ANDERSON
WHITE

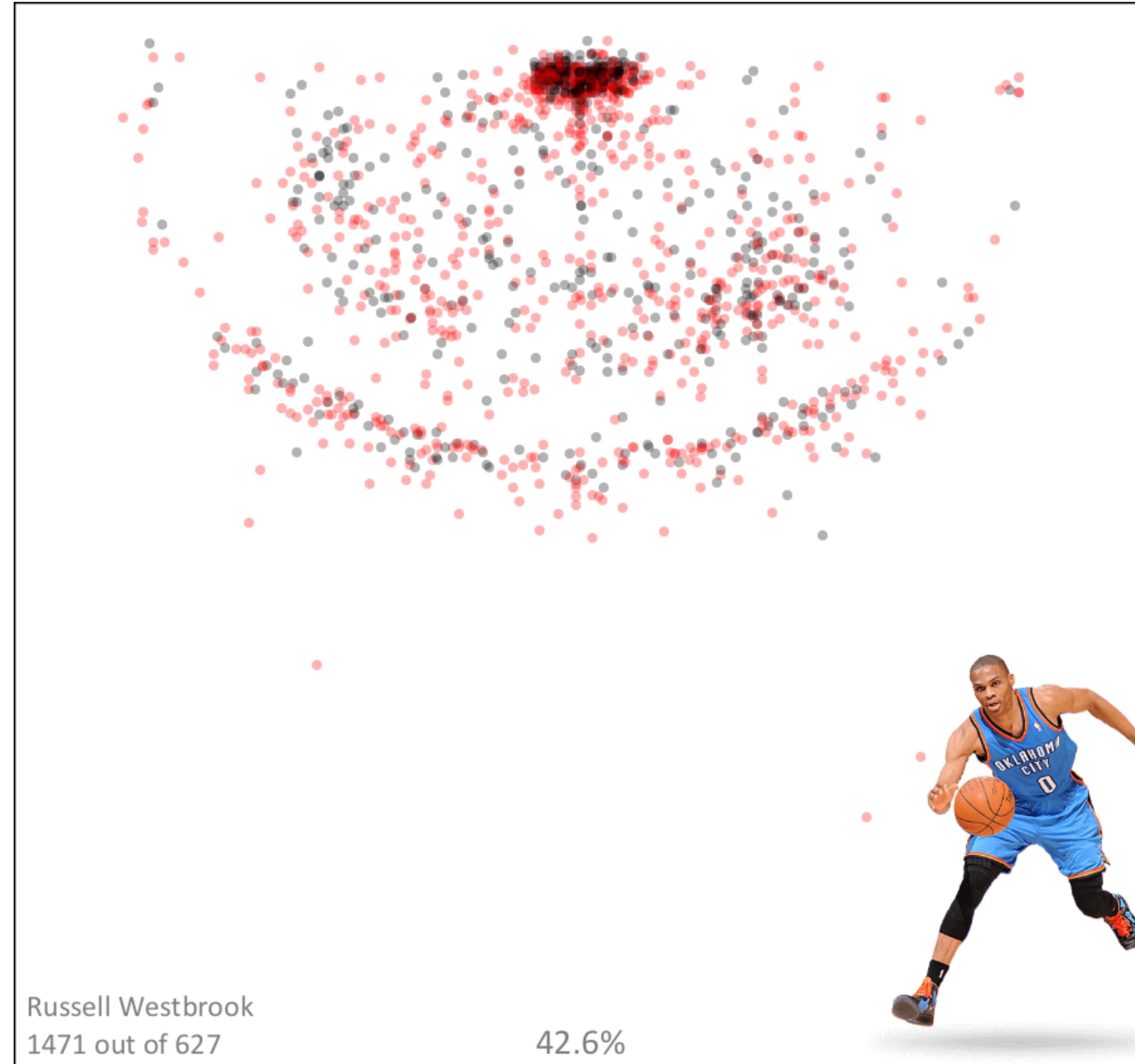


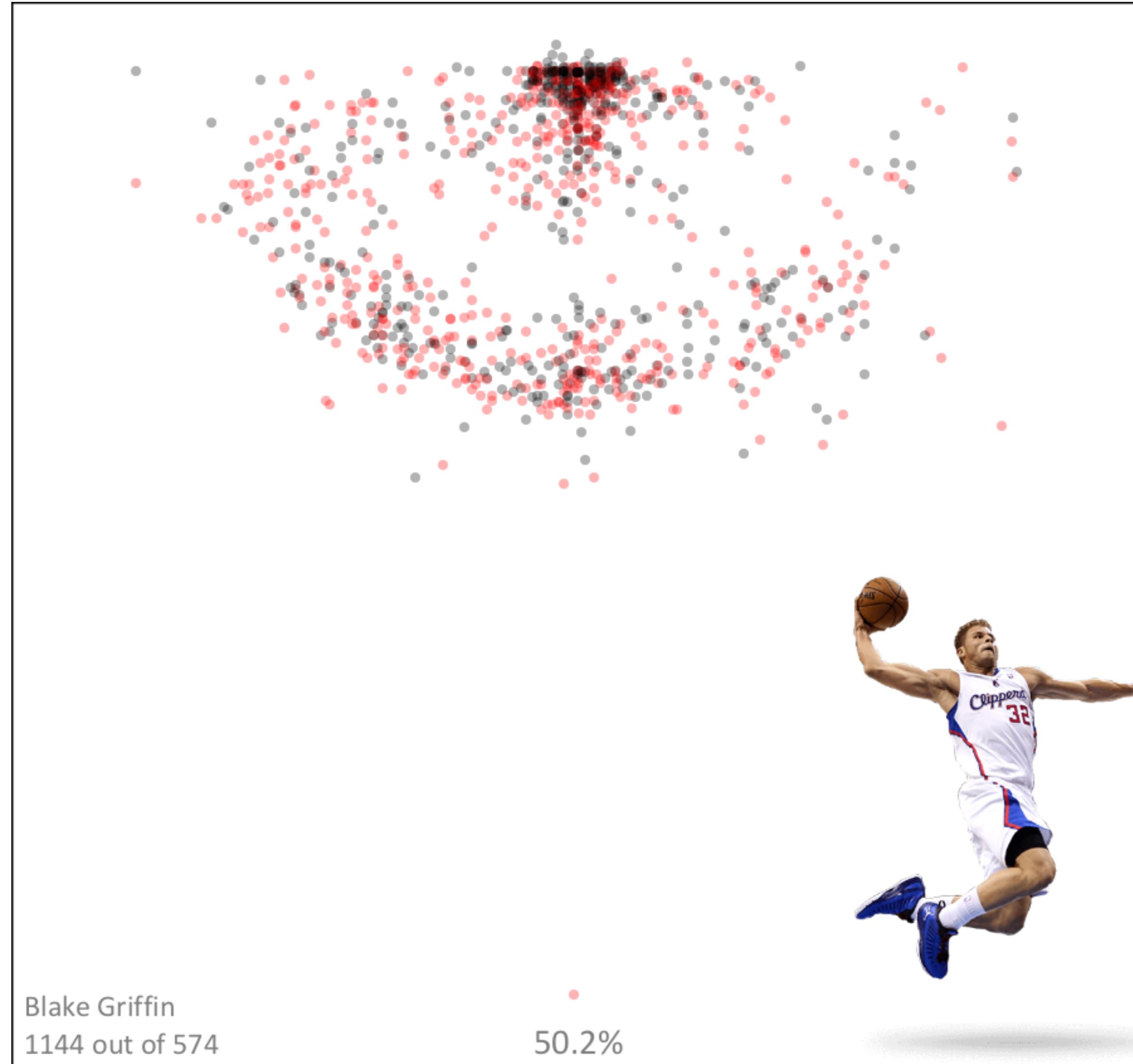
f50 sunset

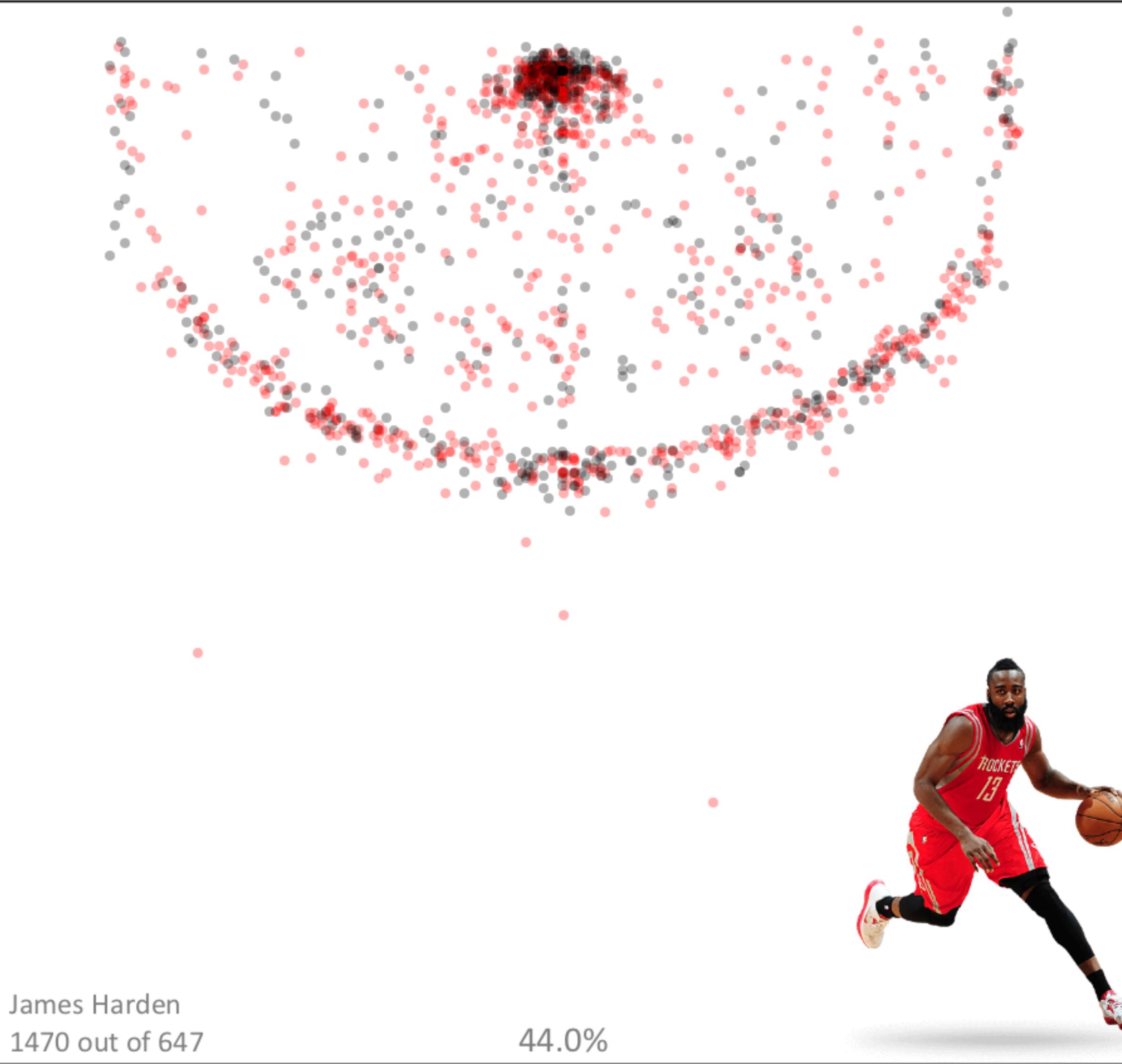
https://api.flickr.com/services/rest/?method=flickr.photos.search&api_key=...&text=sunset&per_page=50&sort=interestingness-desc

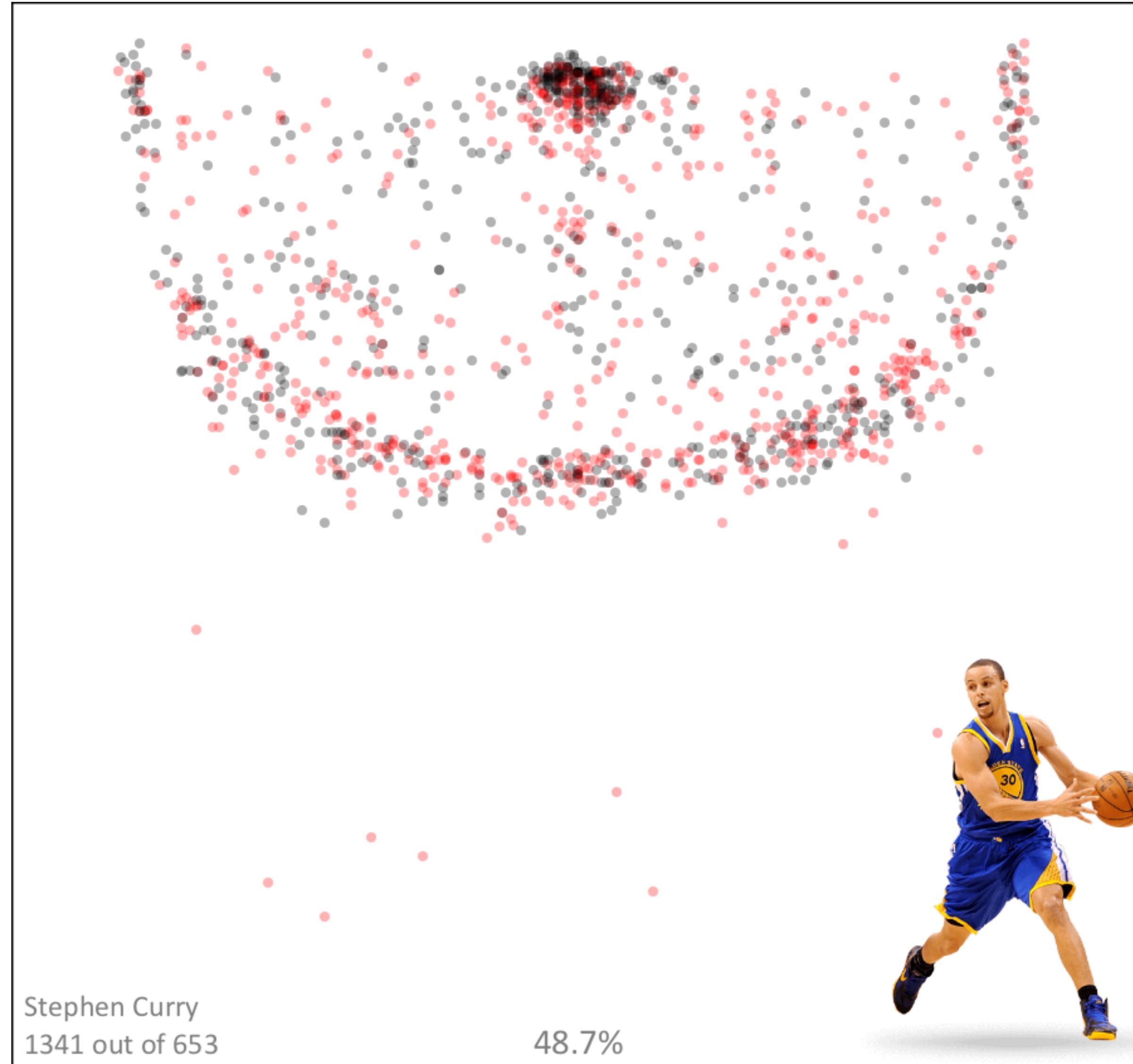
```
<?xml version="1.0" encoding="utf-8" ?>
<rsp stat="ok">
  <photos page="1" pages="105615" perpage="50" total="5280747">
    <photo id="4671838925" ... secret="b070f3363e" server="4068" farm="5" ... />
    <photo id="3590142202" ... secret="c46752e4d8" server="2441" farm="3" .../>
    ...
  </photos>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

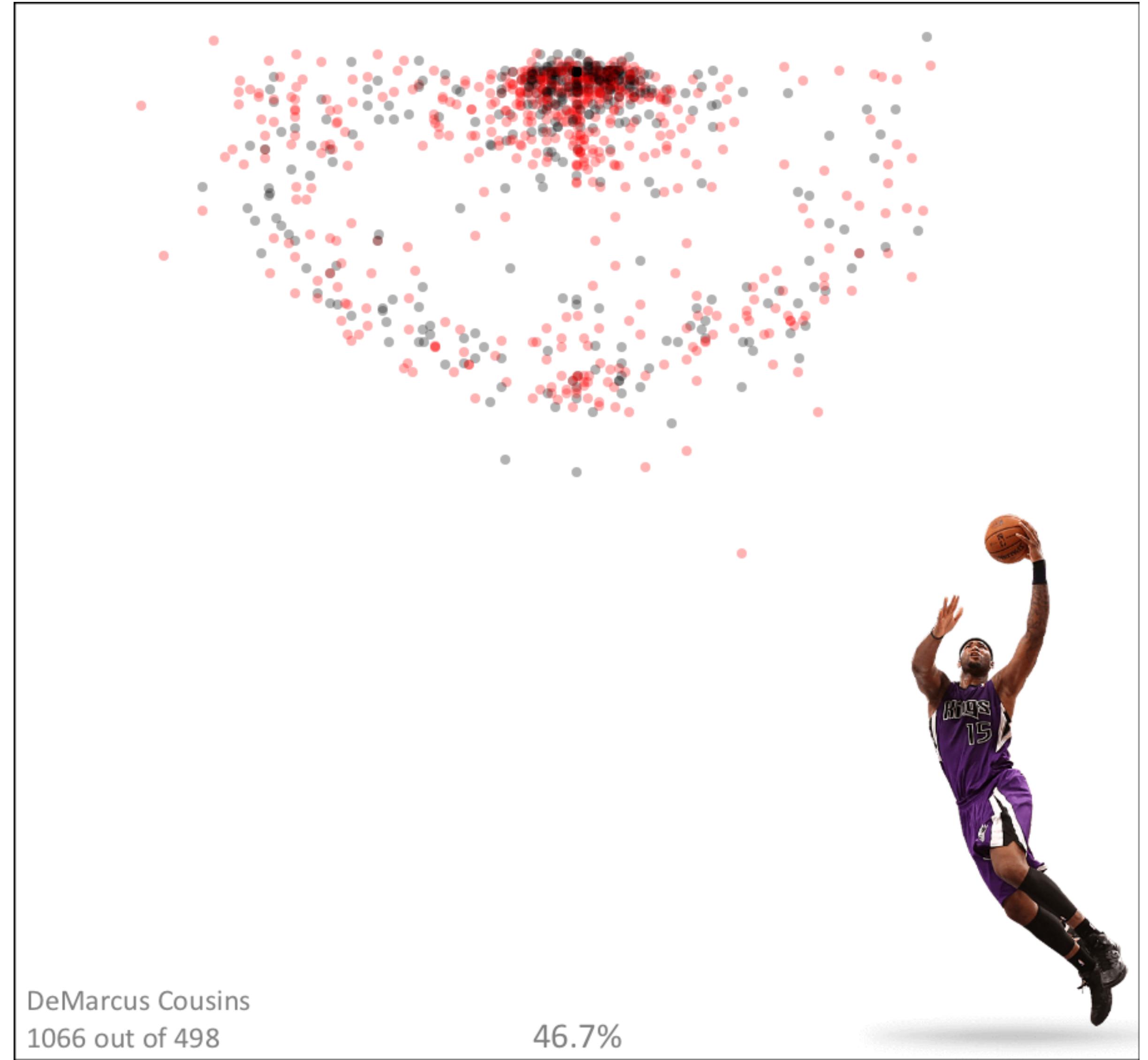


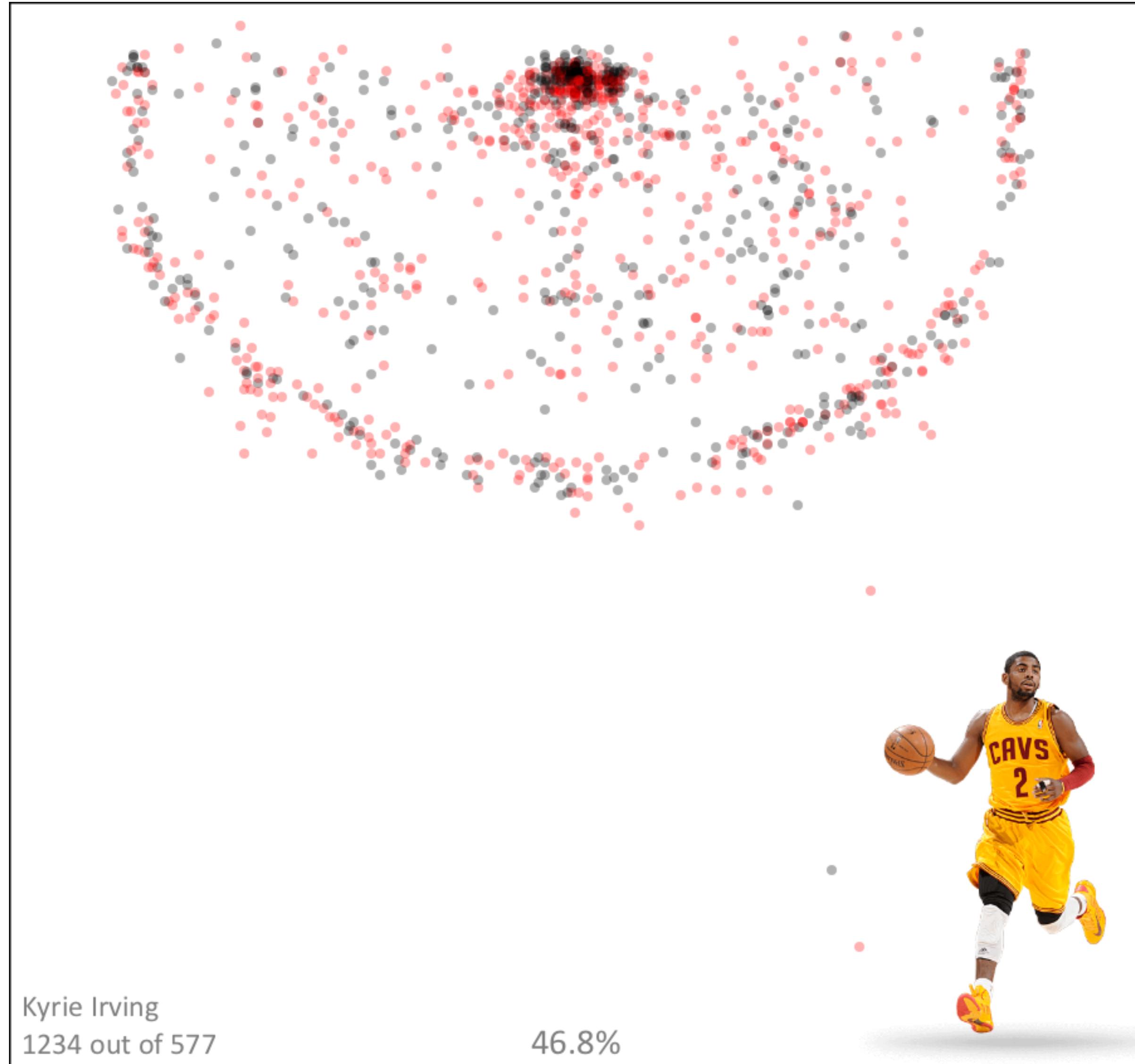


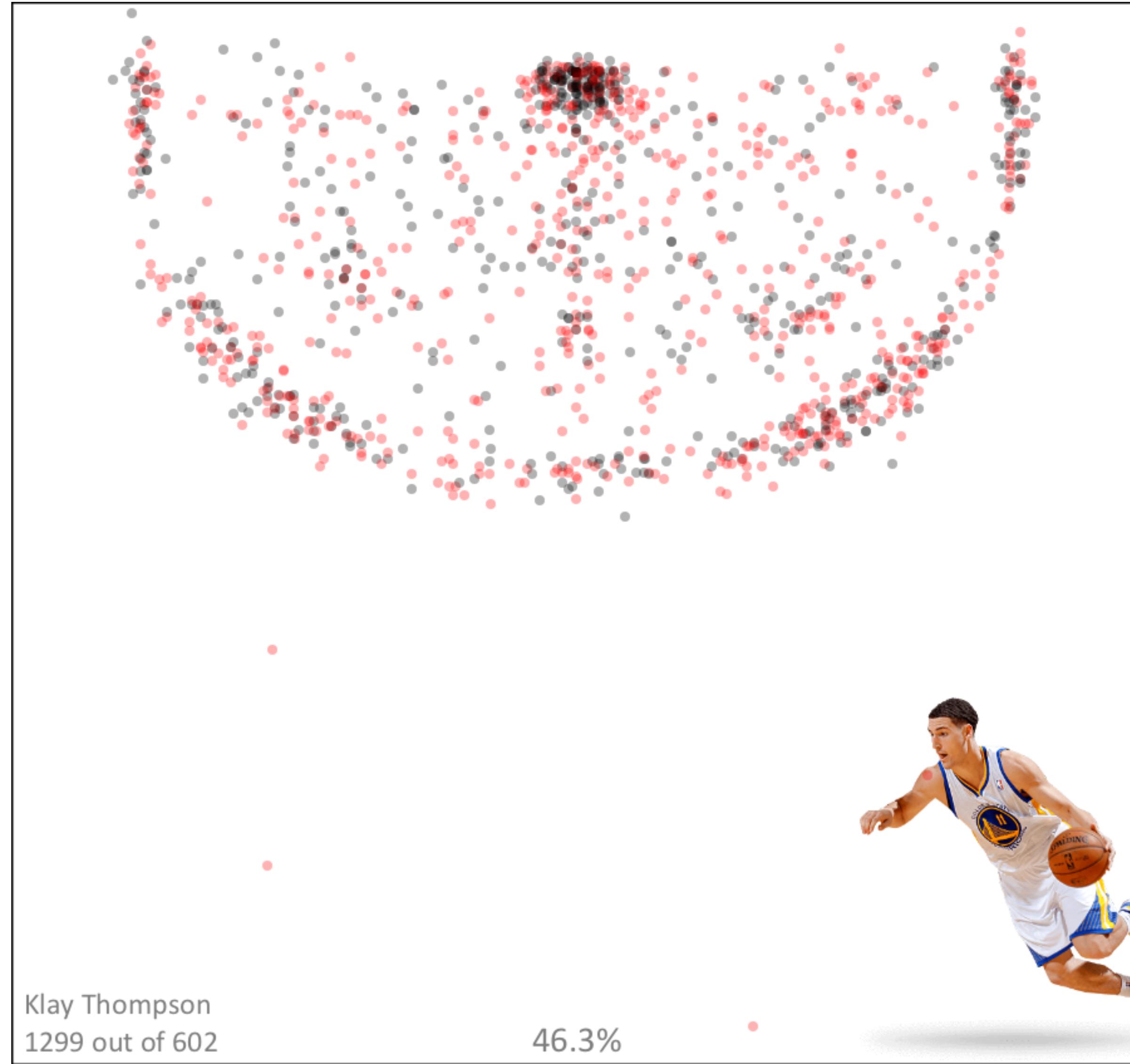


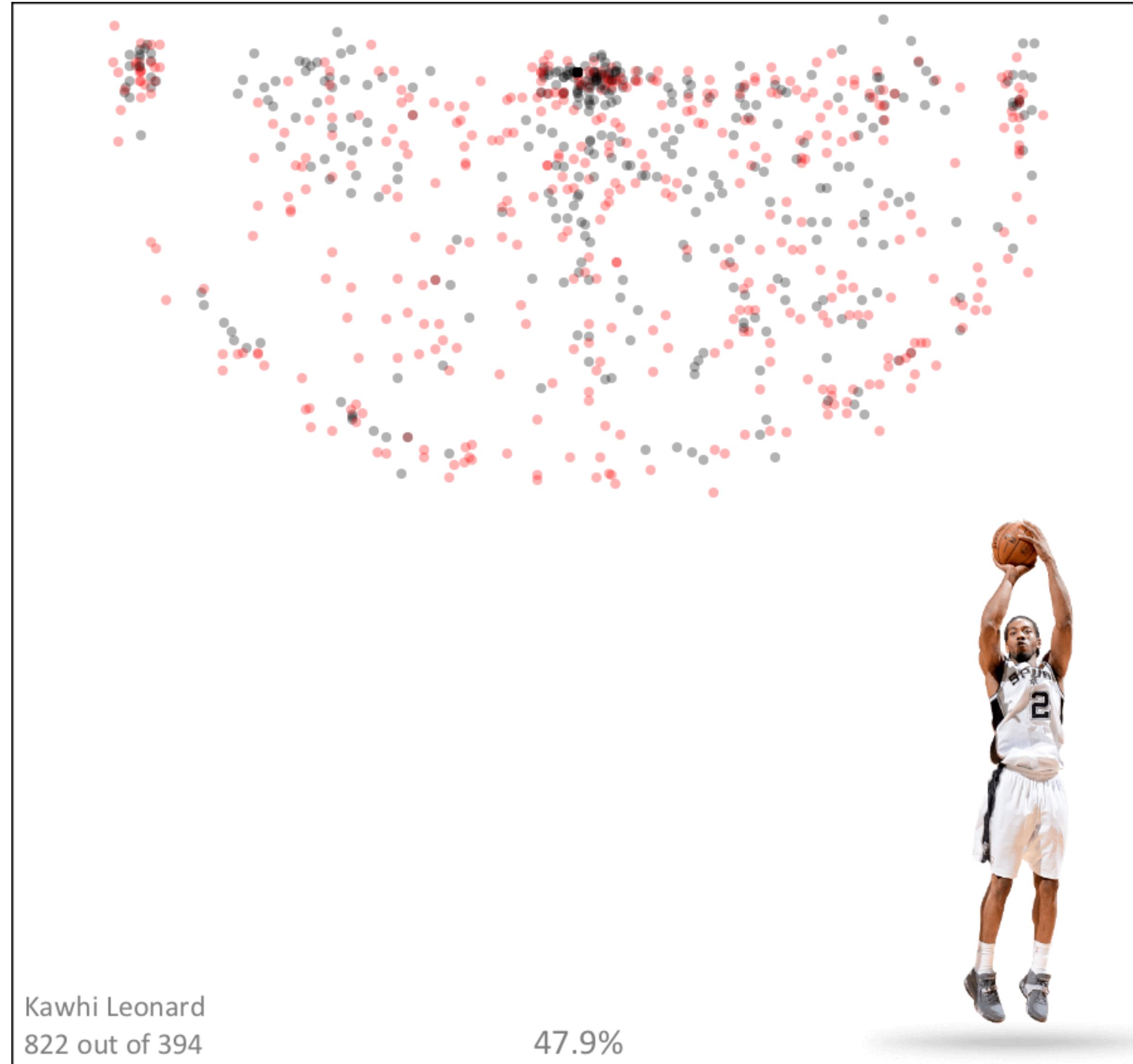


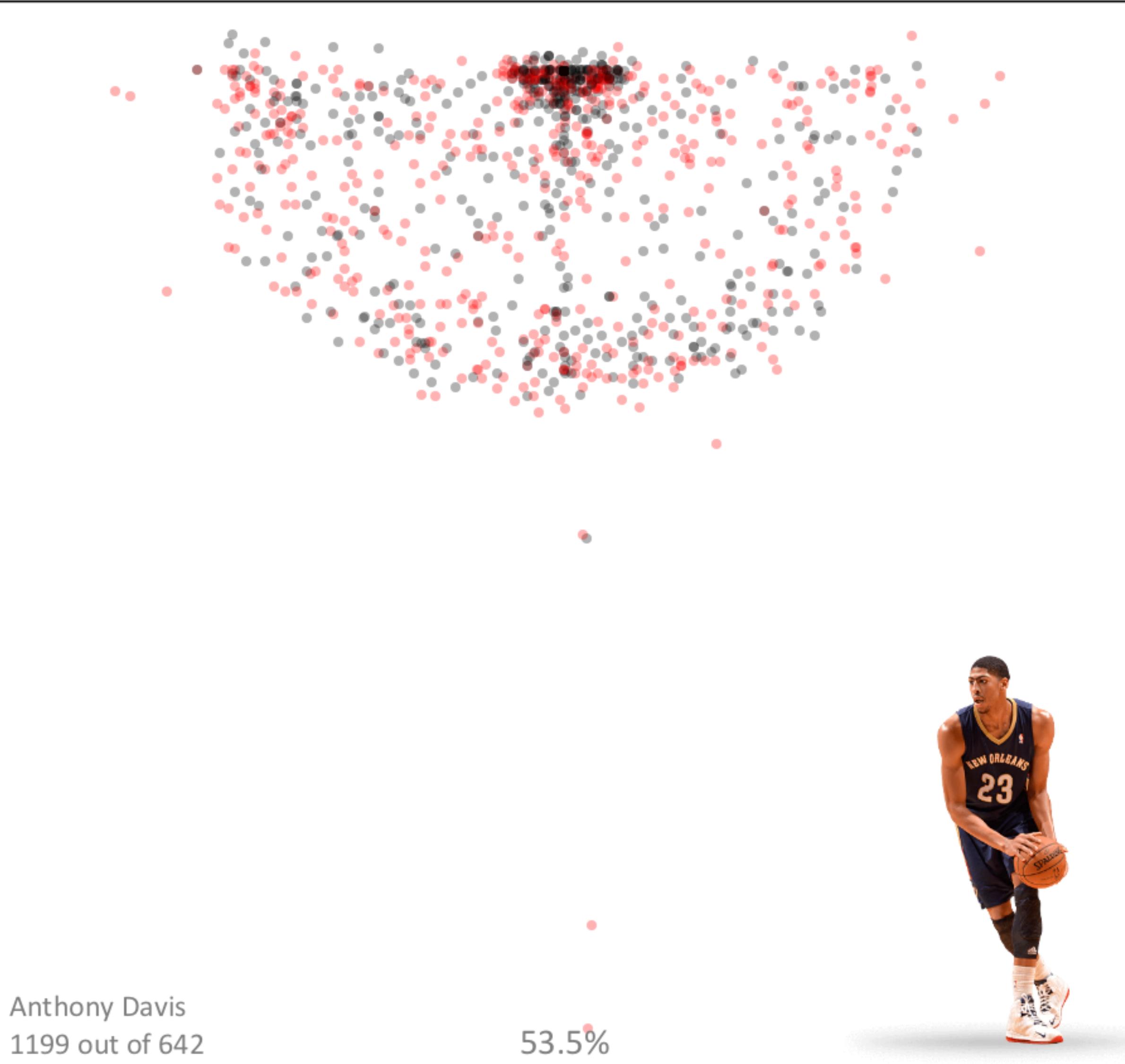


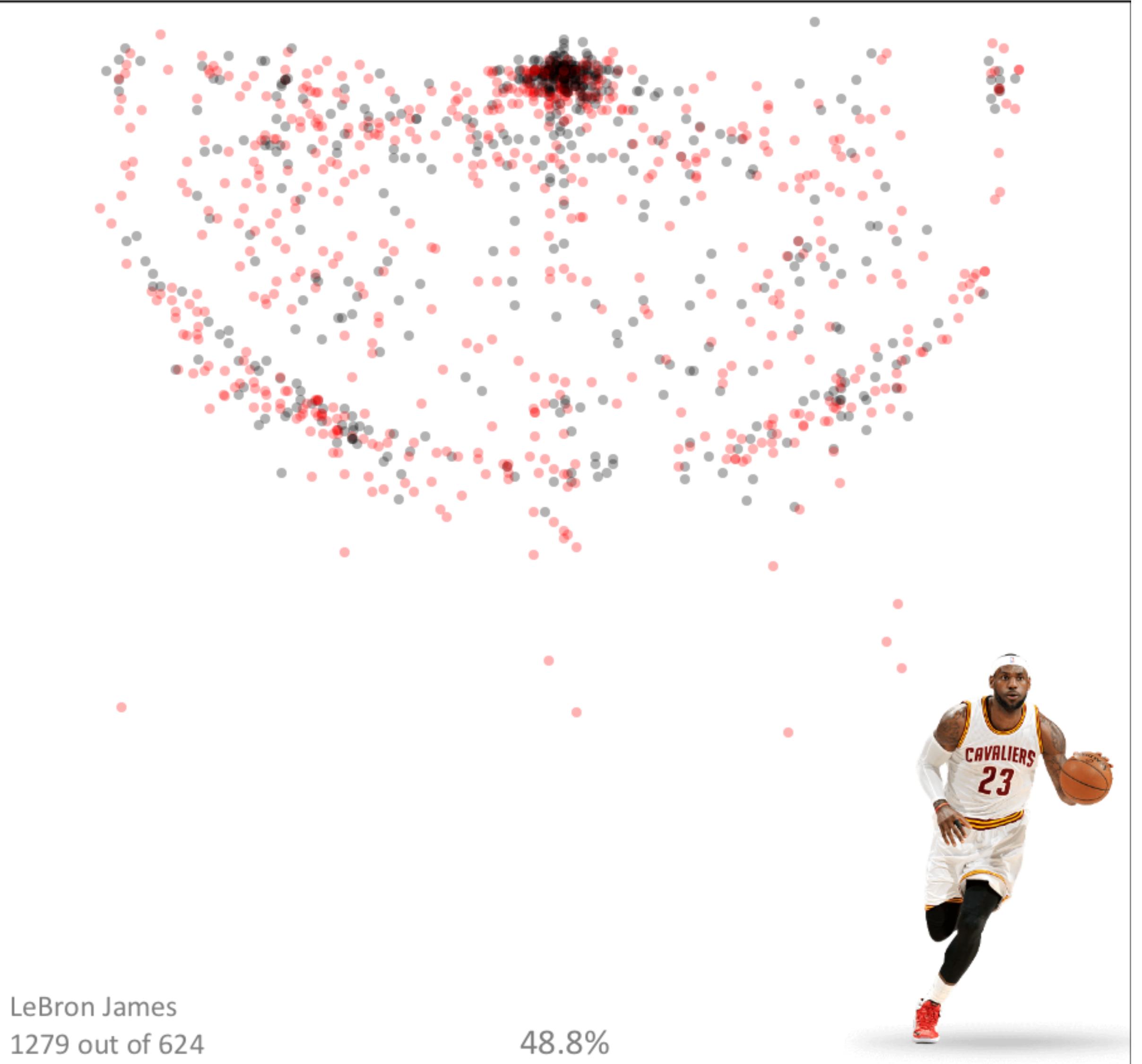


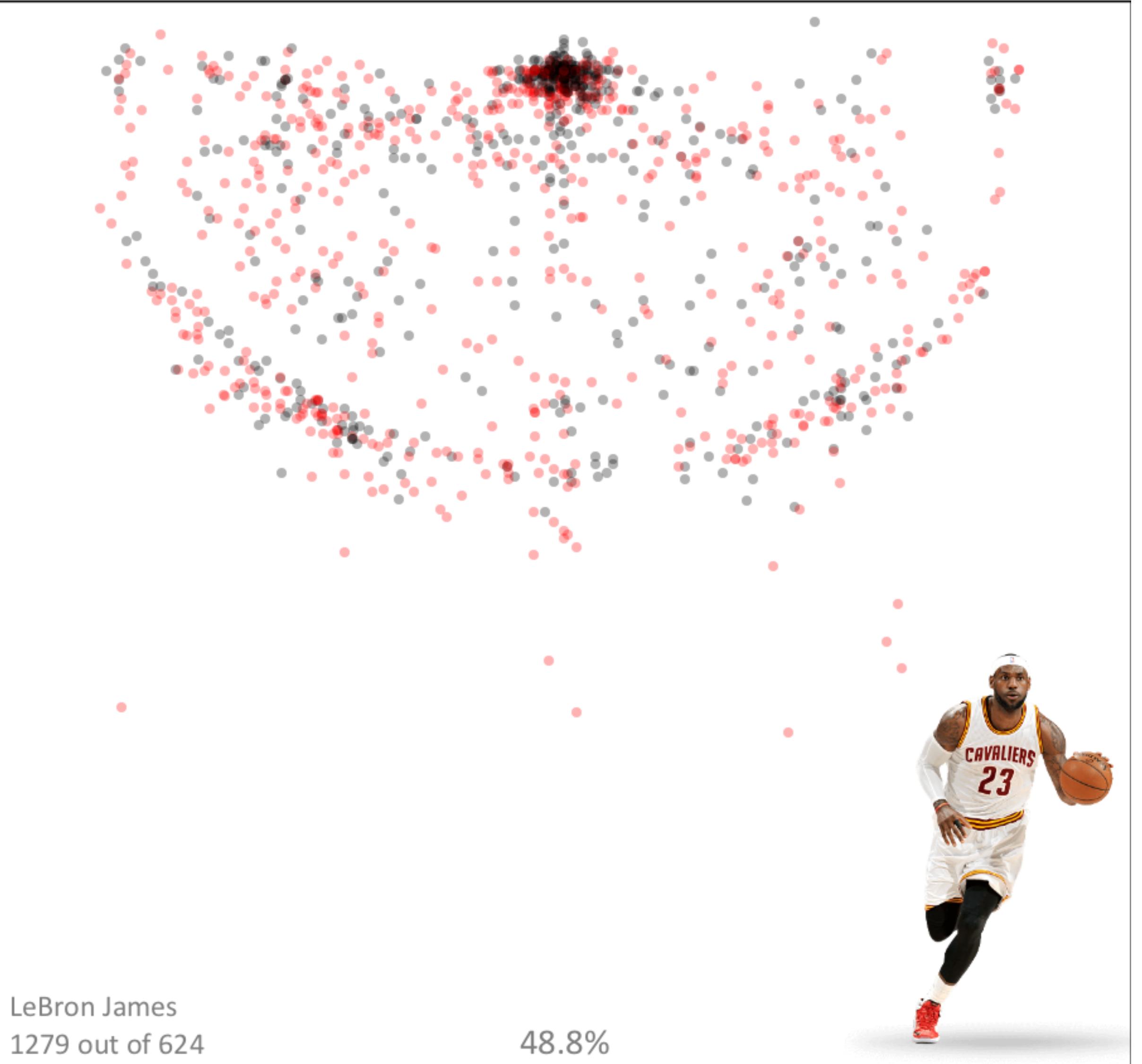








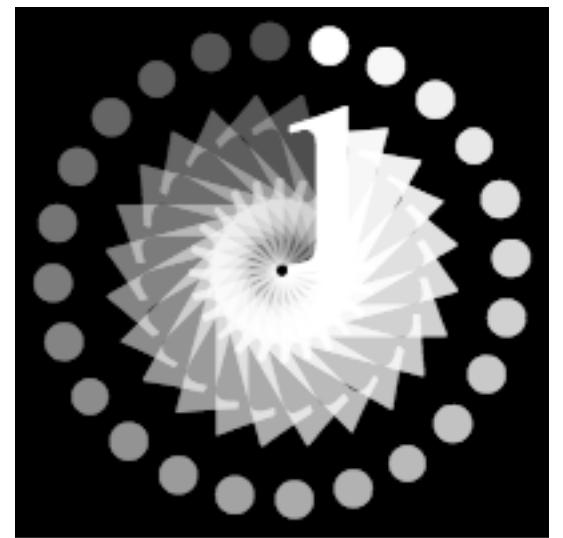




```
func main() {
```

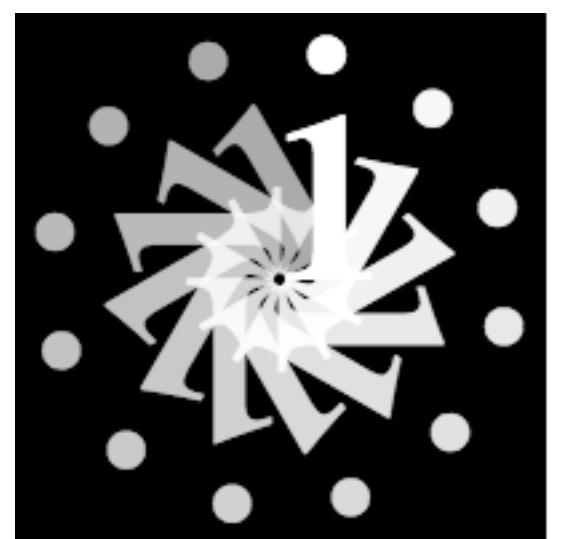
```
    width := 200  
    height := 200  
    a := 1.0  
    ai := 0.03  
    ti := 15.0
```

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")
```

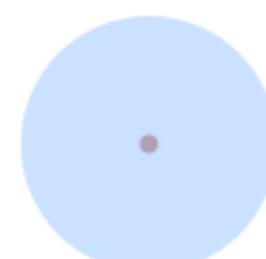
ti = 30



```
    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

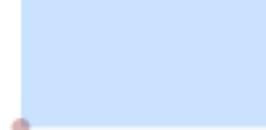




Circle



Ellipse



Rectangle



Rounded Rectangle



Line



Polyline



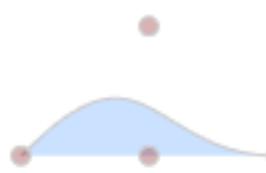
Polygon



Arc



Quadratic Bezier

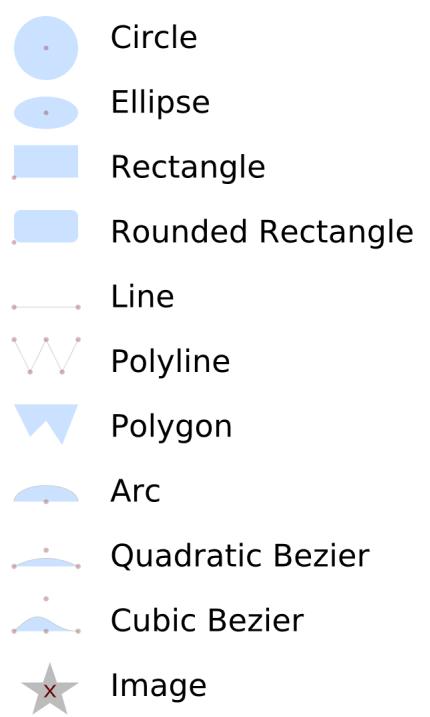


Cubic Bezier

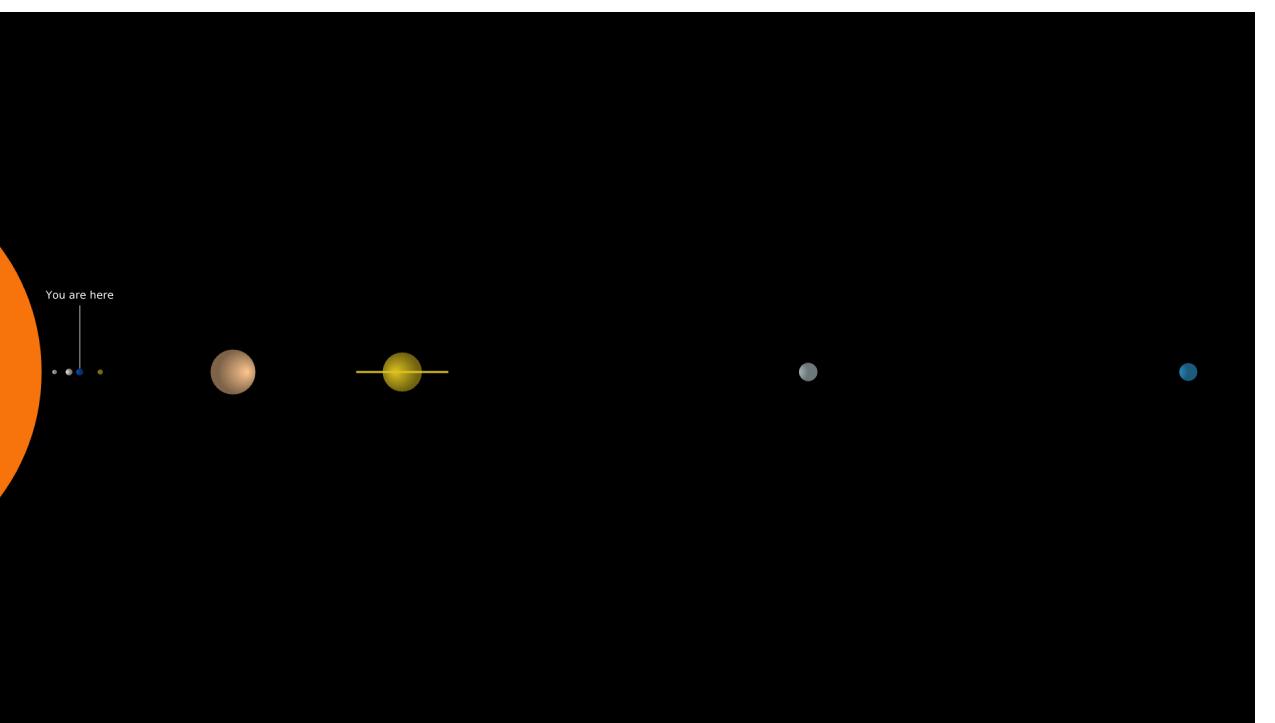
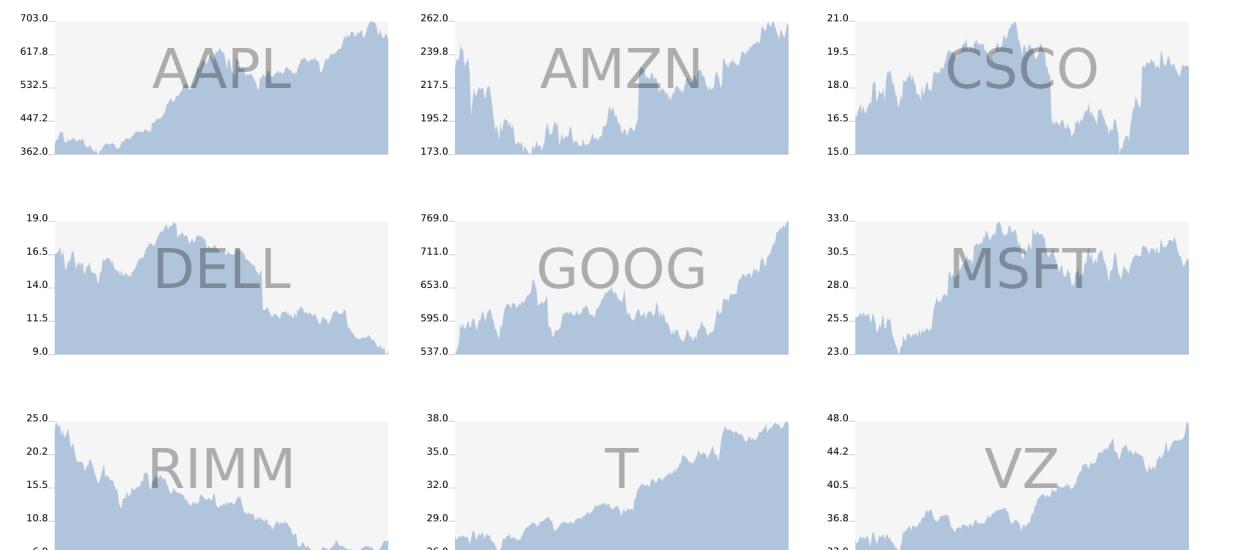
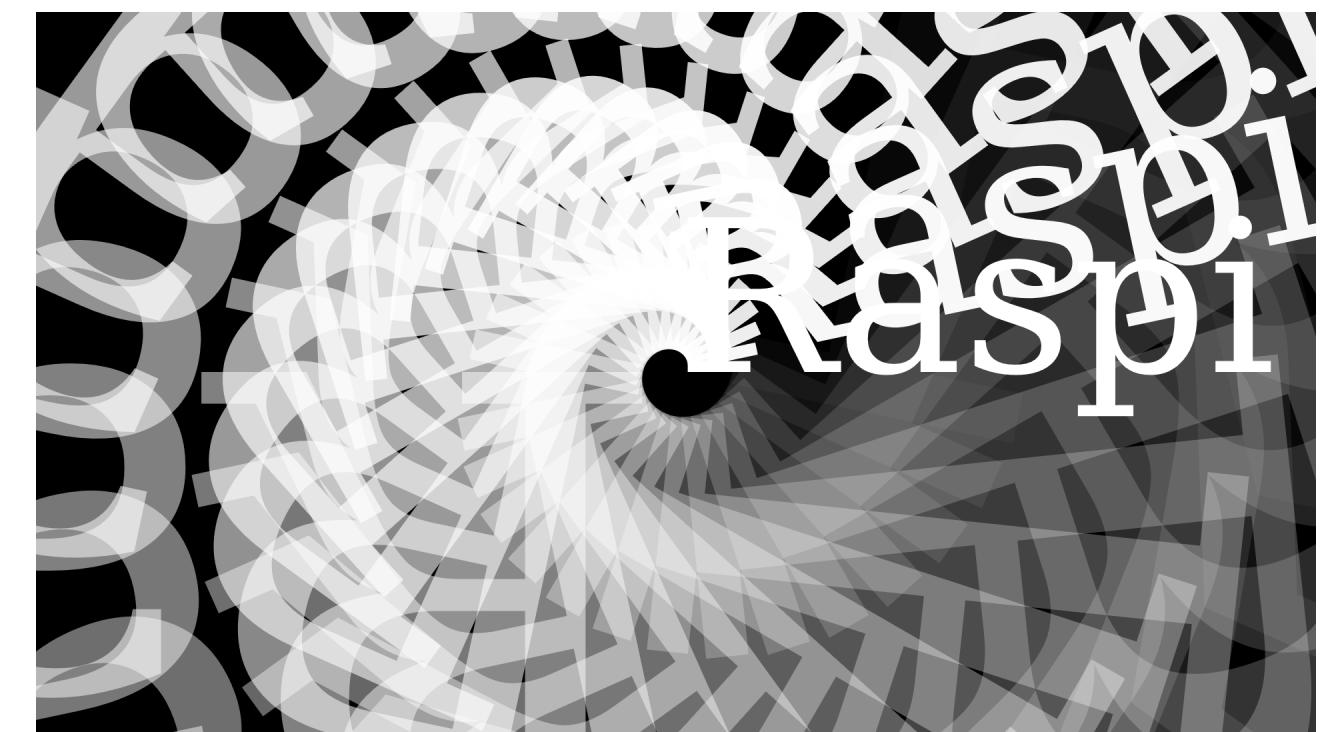
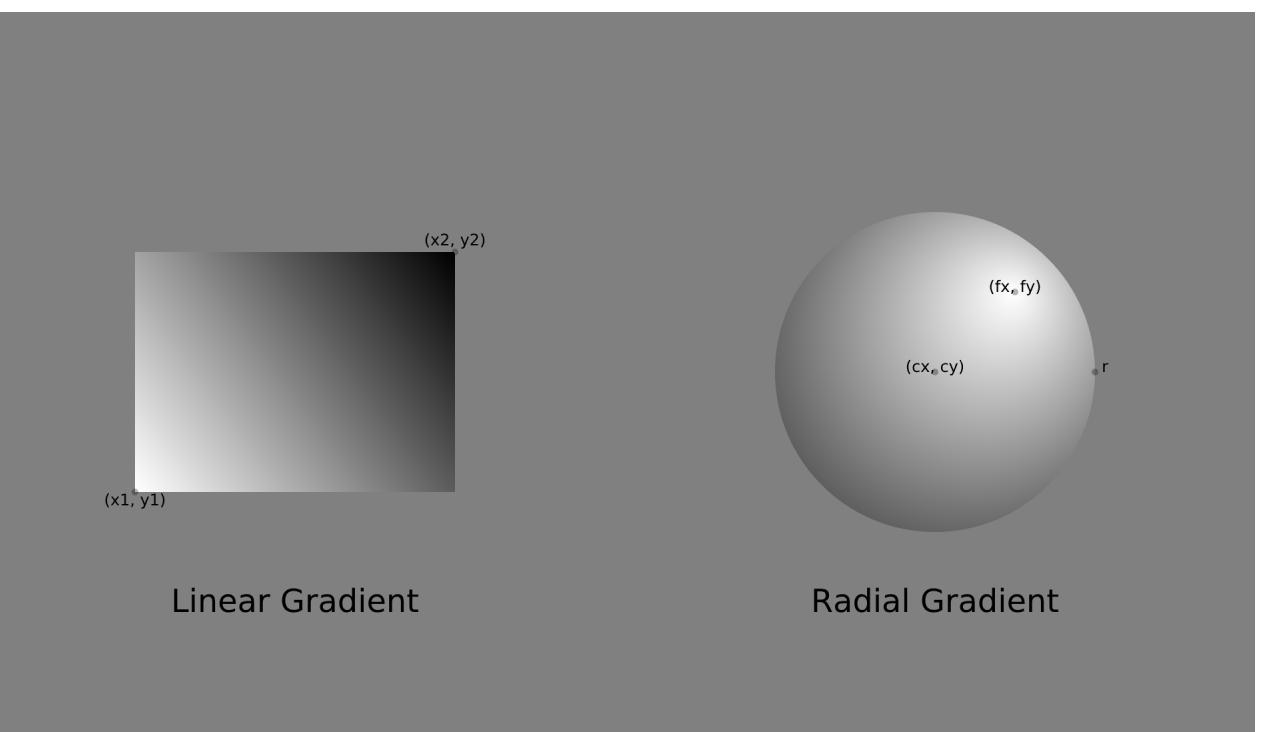


Image

OpenVG on the Raspberry Pi



OpenVG on the Raspberry Pi

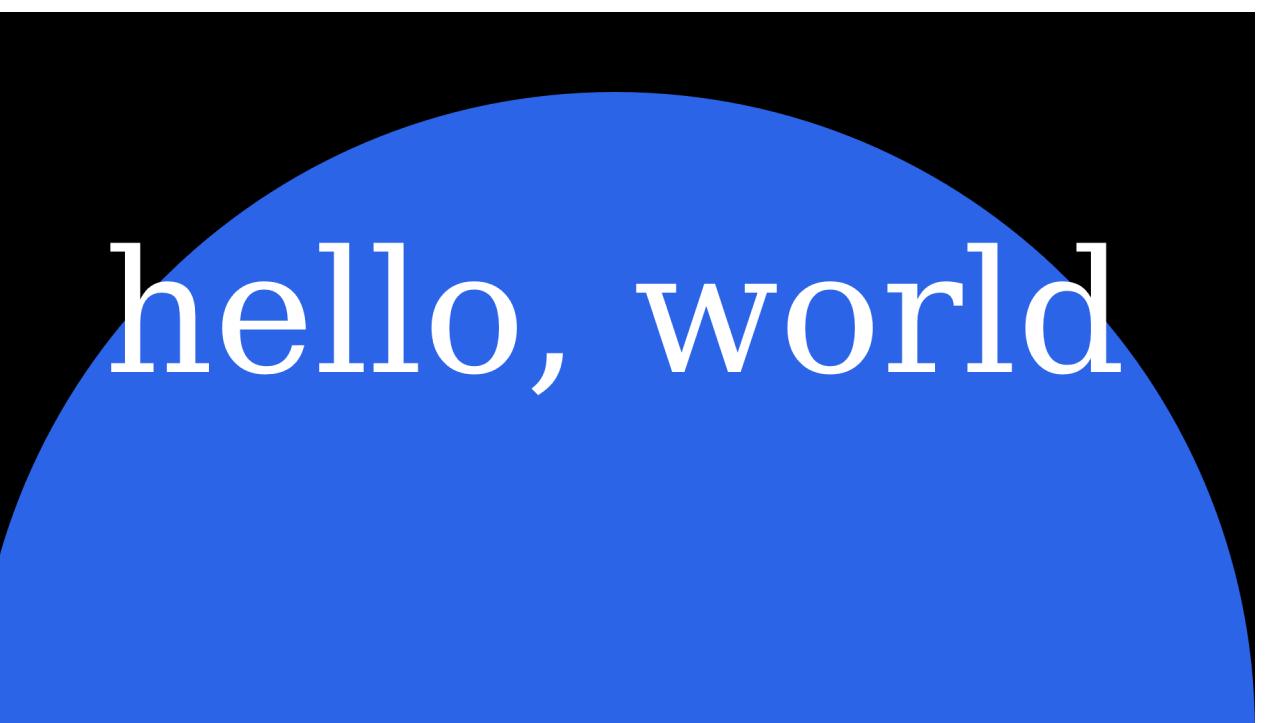


Why I use Go



Anthony Starks

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```
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)

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)

Image (x, y VGfloat, w, h int, s string)

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)

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="4" 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

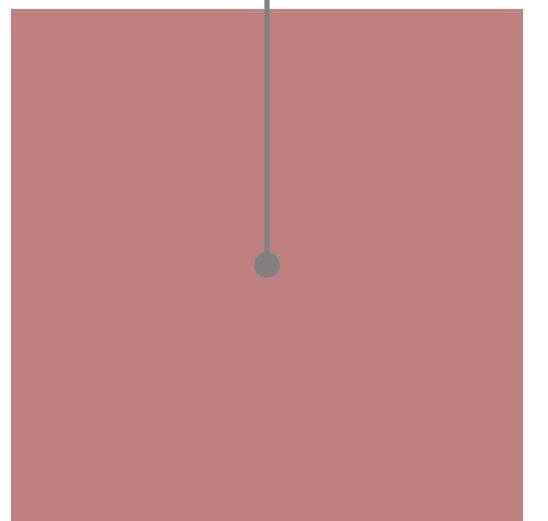
10%, 50%

Hello

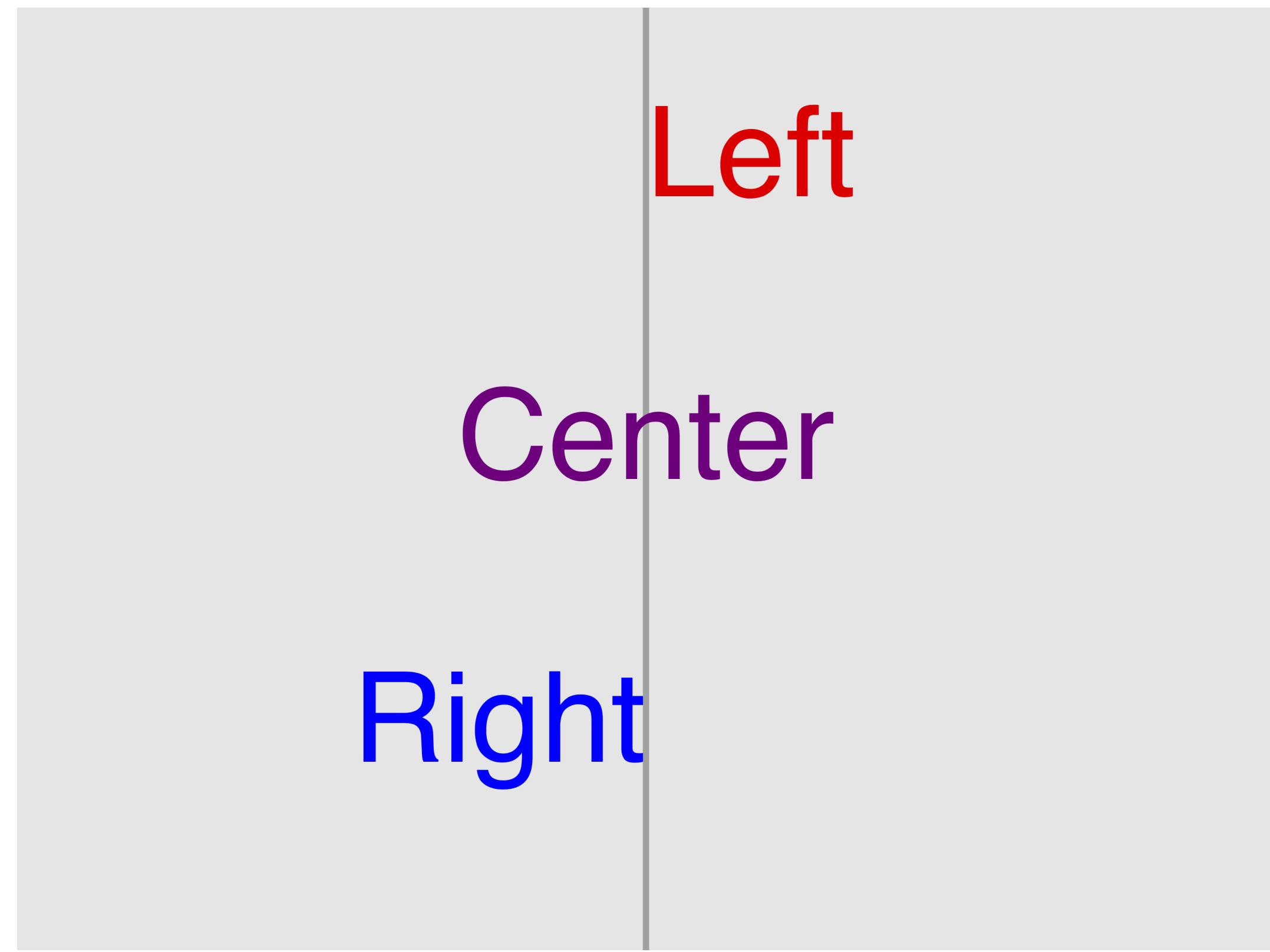
50%, 50%



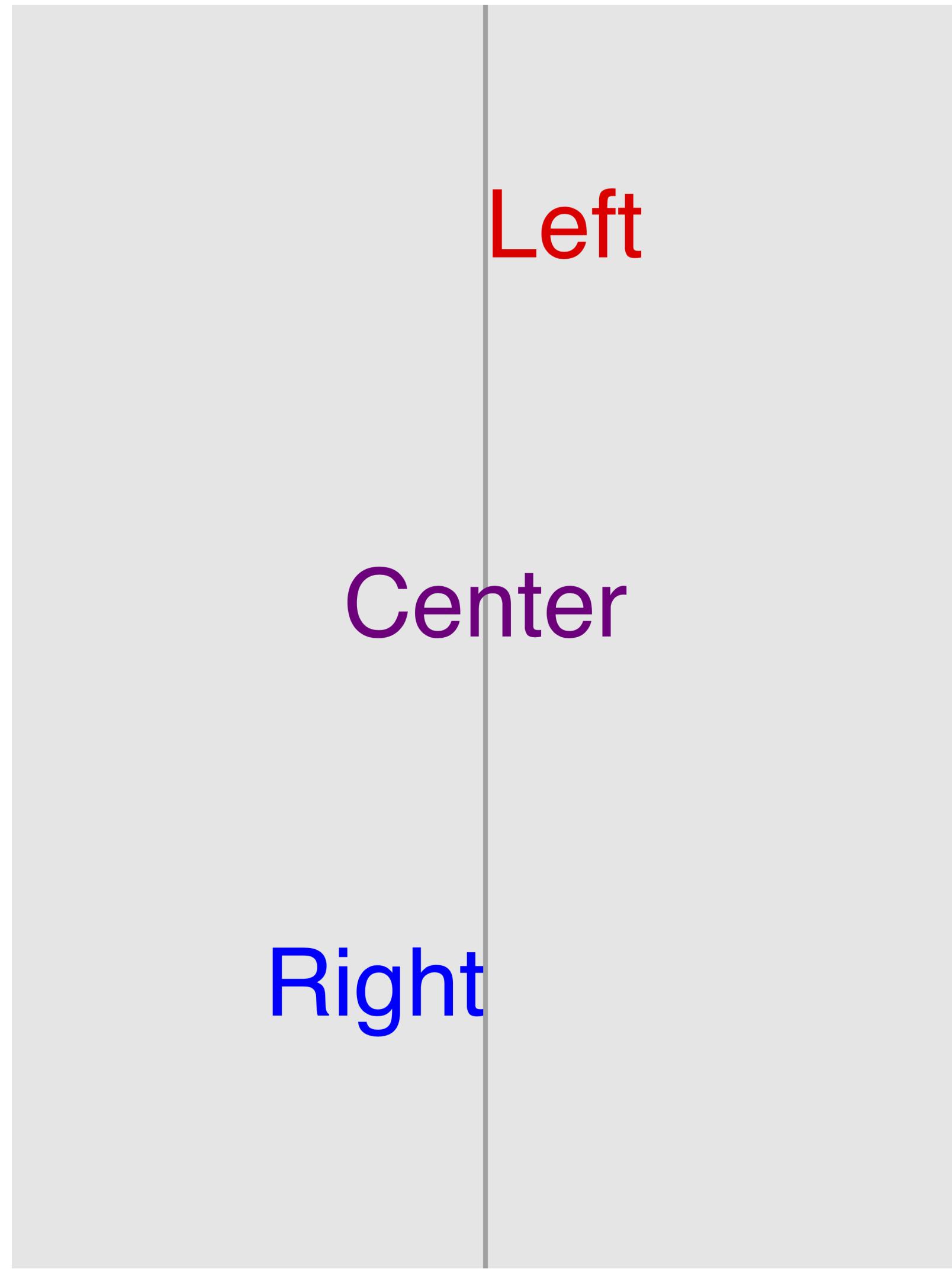
90%, 50%



Percentage-based layout



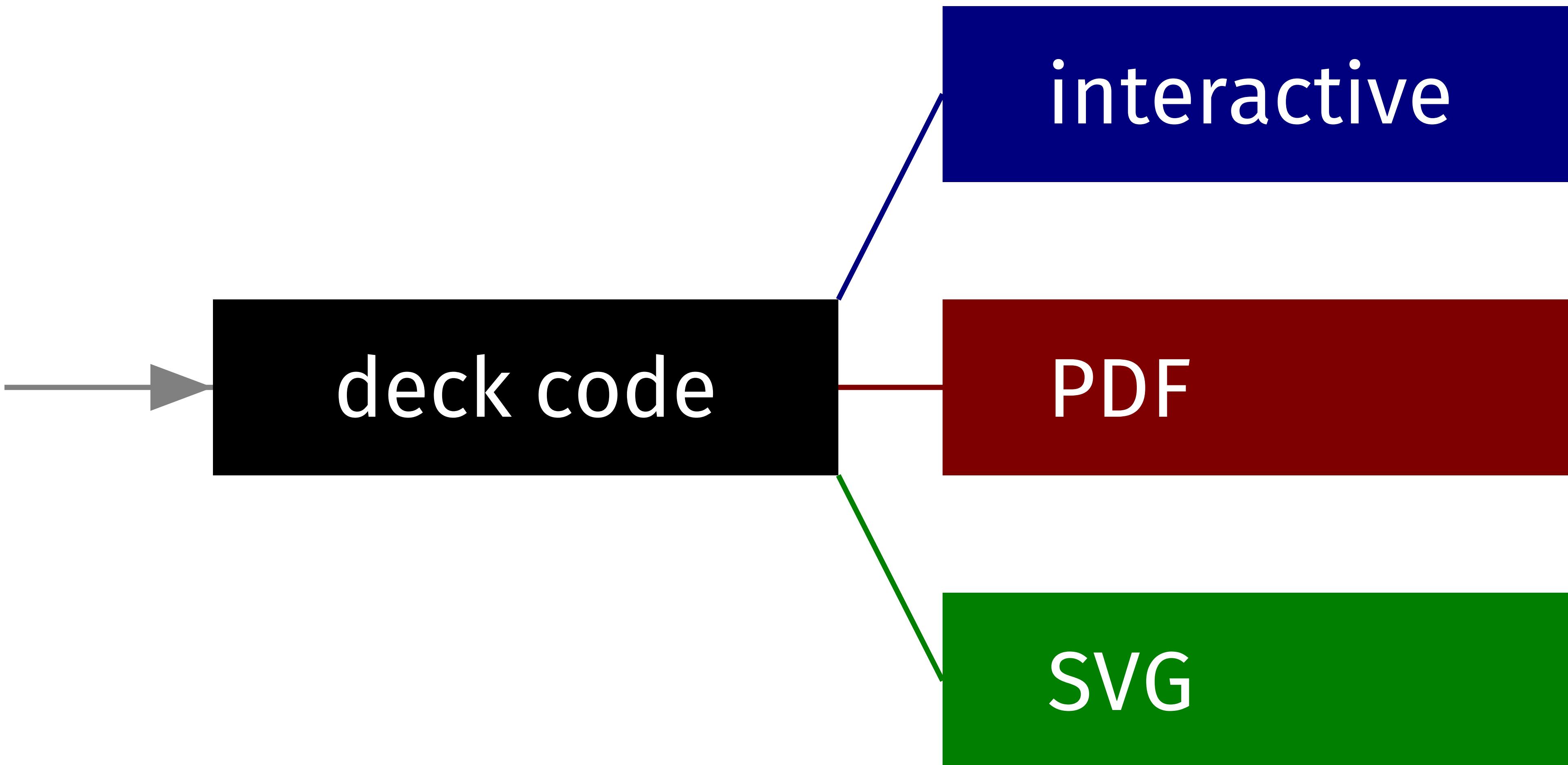
Landscape



Portrait

Scaling the canvas

Process



deck/generate text and list functions

Text	(x, y float64, s, font string, size float64, color string, opacity ...float64)
TextBlock	(x, y float64, s, font string, size, margin float64, color string, opacity ...float64)
TextMid	(x, y float64, s, font string, size float64, color string, opacity ...float64)
TextEnd	(x, y float64, s, font string, size float64, color string, opacity ...float64)
Code	(x, y float64, s string, size, margin float64, color string, opacity ...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, opacity ...float64)
Circle	(x, y, w float64, color string, opacity ...float64)
Ellipse	(x, y, w, h float64, color string, opacity ...float64)
Square	(x, y, w float64, color string, opacity ...float64)
Rect	(x, y, w, h float64, color string, opacity ...float64)
Curve	(x1, y1, x2, y2, x3, y3, size float64, color string, opacity ...float64)
Line	(x1, y1, x2, y2, size float64, color string, opacity ...float64)
Polygon	(x, y []float64, color string, opacity ...float64)

```

package main

import (
    "github.com/ajstarks/deck/generate"
    "os"
)

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

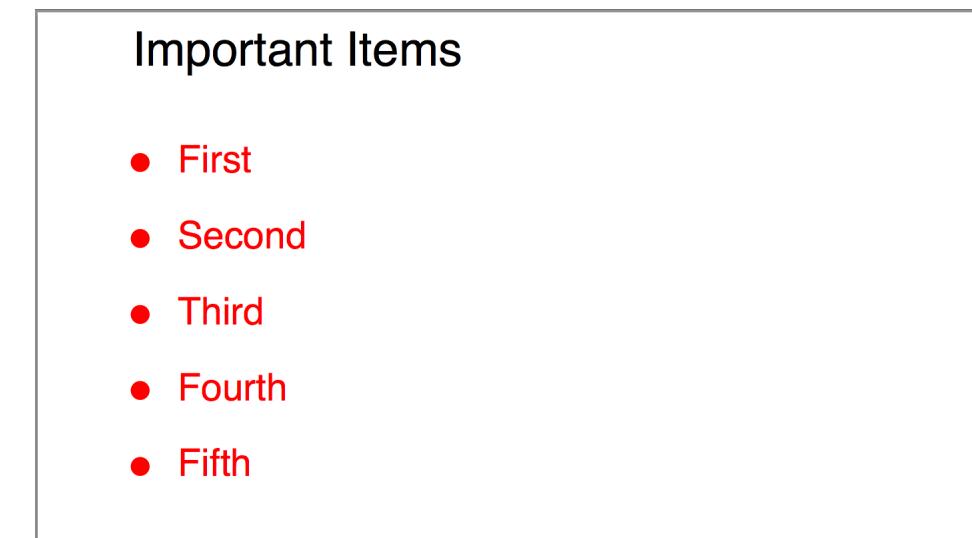
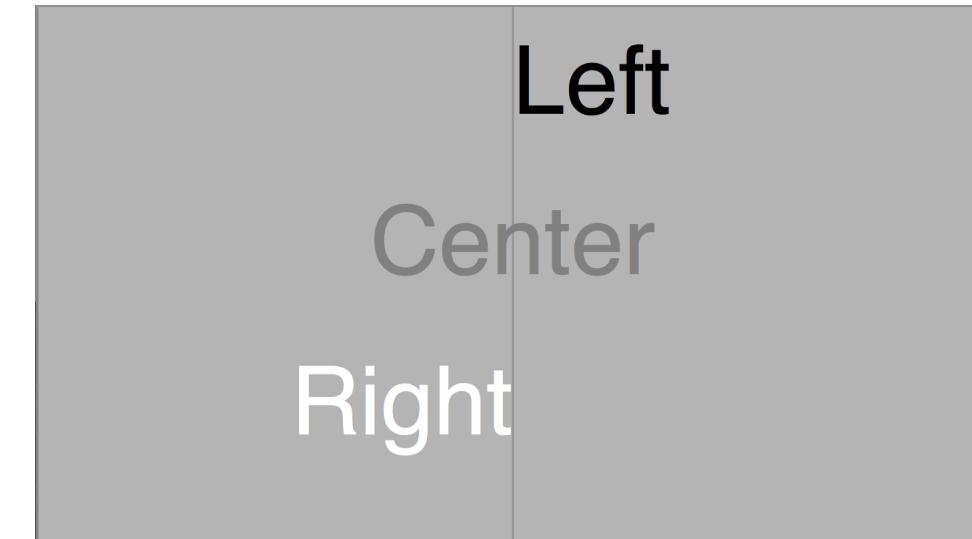
    // Text alignment
    deck.StartSlide("rgb(180,180,180)")
    deck.Text(50, 80, "Left", "sans", 10, "black")
    deck.TextMid(50, 50, "Center", "sans", 10, "gray")
    deck.TextEnd(50, 20, "Right", "sans", 10, "white")
    deck.Line(50, 100, 50, 0, 0.2, "black", 20)
    deck.EndSlide()

    // 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()

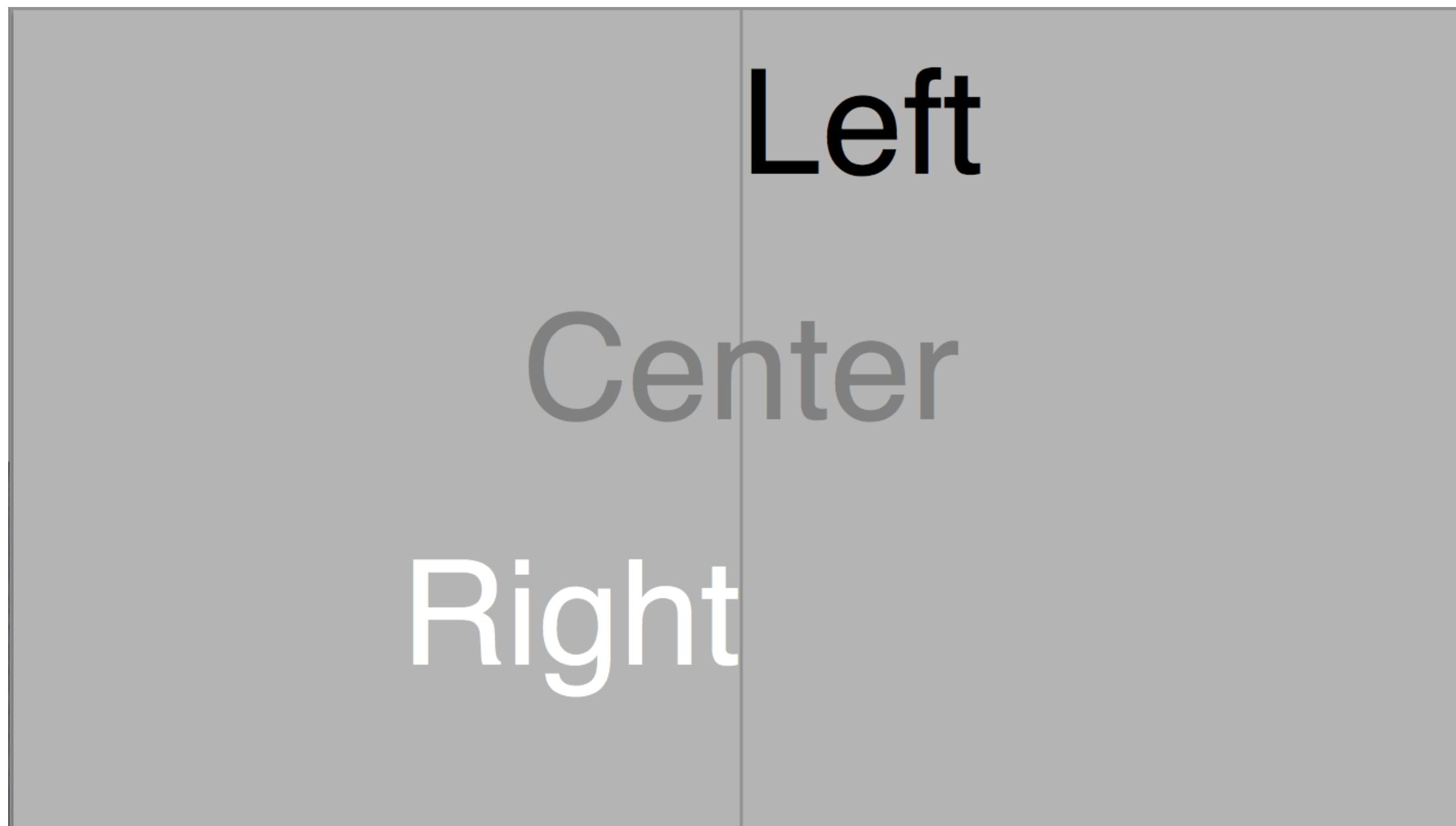
    // Picture with text annotation
    quote := "Yours is some tepid, off-brand, generic 'cola'. " +
        "What I'm making is \"Classic Coke\""
    person := "Heisenberg"
    deck.StartSlide("black", "white")
    deck.Image(50, 50, 1440, 900, "classic-coke.png")
    deck.TextBlock(10, 80, quote, "sans",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

    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 lasts.

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

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: "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." Below this, there is another quote: "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." At the bottom, there is a final note: "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 is then summarized as "The issue, then, is that Go's success would contradict their world view."

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

AAPL	119.08	3.58	(3.10%)
AMZN	599.03	35.12	(6.23%)
FB	102.19	2.52	(2.53%)
GOOG	702.00	50.21	(7.70%)
MSFT	52.87	4.84	(10.08%)

AAPL	114.55	-0.73 (-0.63%)
AMZN	611.01	2.40 (0.39%)
FB	103.70	-0.07 (-0.07%)
GOOG	708.49	-4.29 (-0.60%)
MSFT	53.69	-0.56 (-1.03%)

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

This is not a index card

Rich

Can't buy me love

Bliss

Worse

Better

Misery

We have each other

Poor

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

Andrew Mackenzie-Ross



FOR, LO,

the winter is past,
the rain is over and gone;
The flowers appear on the earth;
the time for the singing of birds is come,
and the voice of the turtle is heard in our land.

Song of Solomon 2:11-12

Good Design

is innovative

makes a product useful

is aesthetic

makes a product understandable

is unobtrusive

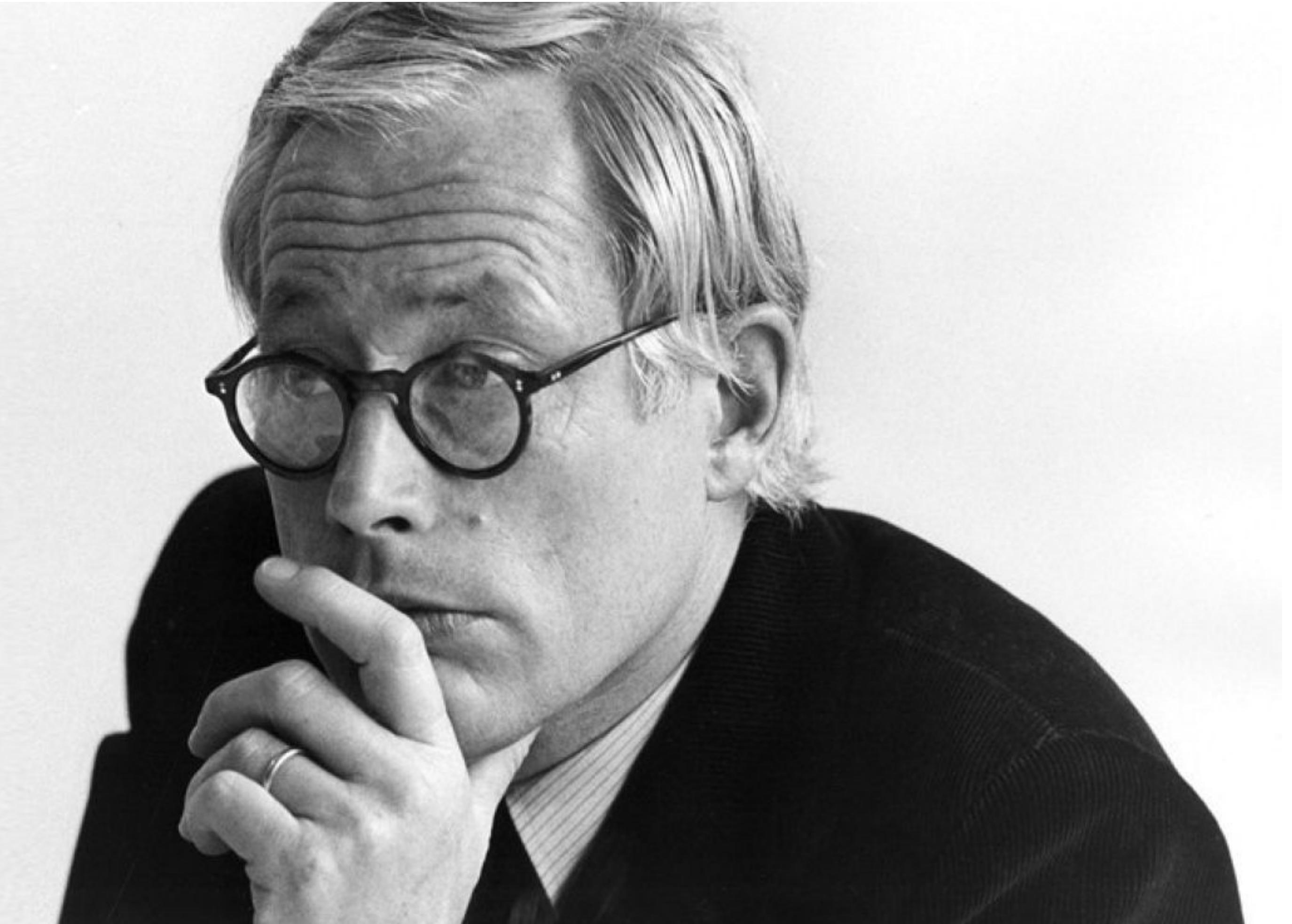
is honest

is long-lasting

is thorough down to the last detail

is environmentally-friendly

is as little design as possible



What is it about Go?

f m t

func

Writer
Reader

net/http

encoding/xml

encoding/json

cgo

The Community

Re: [go-nuts] Visualizing Random Number Generators: /dev/urandom vs. Go rand package

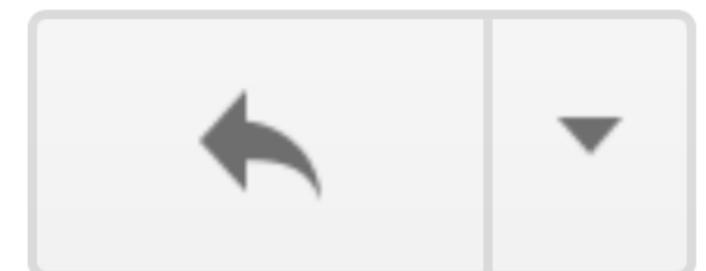


Inbox x



Russ Cox rsc@golang.org via google.com

3/5/10



to me ▾

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”

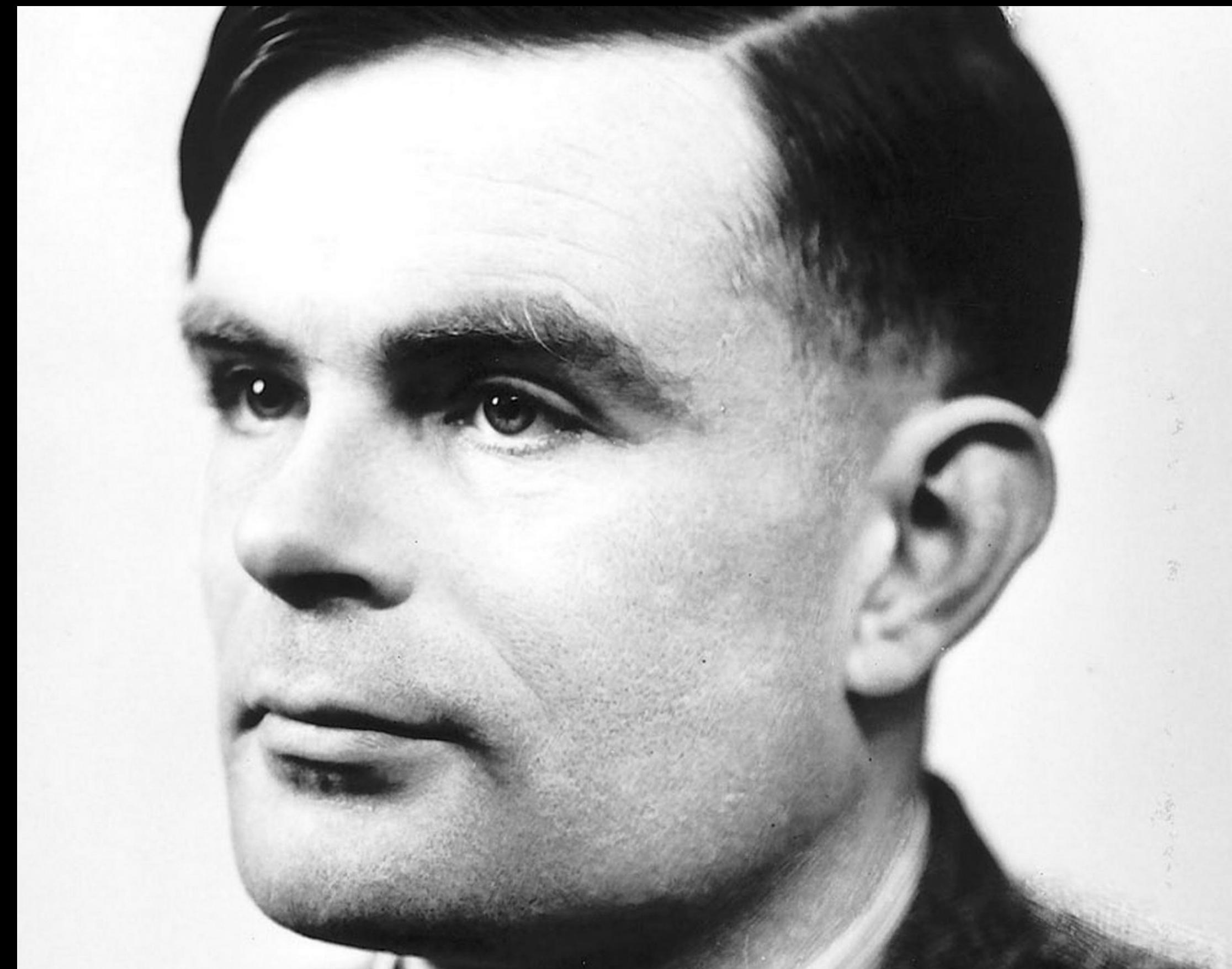
Go is not the product of a Whiggish development process. We were just trying to get something that worked for us.

Rob Pike, “Origin of Go’s interface design”, golang-nuts

Making Tools

Fun

Reducing the distance from
the idea to the picture





Picasso



Turing