

# Adventures in Scaling Shiny:

## Lessons learned building DynastyProcess

Tan Ho

Senior ML Engineer, Teamworks Zelus Soccer

Shiny in Production 2024

[tanho.ca/scaling-shiny](https://tanho.ca/scaling-shiny)



how it all started



# <2019

“the before times”



- Undergrad in commerce
- Joined family business in residential rentals
- Property manager for 6+ years

... absolutely hated it

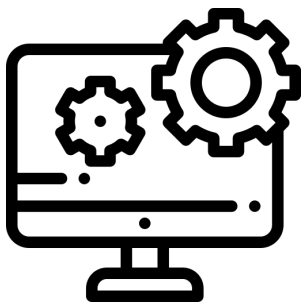
# my escape: fantasy football




- How do I build the best teams?
- How do I make better fantasy football trades?
- How much better is my team than my friend's?

# problem: I have too many fantasy leagues




How do I analyze these leagues  
at scale?




- Excel & PowerQuery / PowerBI
- Scraping websites
- Automating league analyzer spreadsheets

 r/DynastyFF [Join](#) • 7y ago • 📁




**DynastyFFDashboard - Fleaflicker edition :)** [DISCUSSION](#)

  6  33 comments [Share](#) [Report](#)


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 r/DynastyFF [Join](#) • 7y ago • 📁




**[Discussion] DynastyFFDashboard - le TwoQBs/Superflex update!** [DISCUSSION](#)

  12  13 comments [Share](#) [Report](#)


---

 r/DynastyFF [Join](#) • 7y ago • 📁




**[Discussion] DynastyFFDashboard updates** [DISCUSSION](#)

  11  15 comments [Share](#) [Report](#)


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


**[Discussion] Developing a superflex valuation system: take this survey!** [DISCUSSION](#)

  9  11 comments [Share](#) [Report](#)


---

 r/DynastyFF [Join](#) • 7y ago • 📁




**[Discussion] Dynasty FF Dashboard: ESPN Version** [DISCUSSION](#)

  15  57 comments [Share](#) [Report](#)


---

 r/DynastyFF [Join](#) • 7y ago • 📁




**[Discussion] DynastyFFDashboard: an excel sheet for tracking your leagues** [DISCUSSION](#)

  26  26 comments [Share](#) [Report](#)

---

 r/DynastyFF [Join](#) • 7y ago • 📁

**[Discussion] Wrote customized team profiles for a league** [DISCUSSION](#)

  20  18 comments [Share](#) [Report](#)

look ma, reddit karma!

---

*“needs Excel on Windows, because MS PowerQuery”*

## Excel Sheets for Tracking Your Dynasty League

- This is mostly designed for offseason use - but in-season editions planned!
- Rosters and draft picks scraped straight from MFL, ESPN, Fleaflicker and Manual Entry - Yahoo support currently planned.
- Dynasty rankings pulled on-demand straight from FantasyPros (and incorporates DynastyFFTools-type valuations)
- Redraft rankings pulled on-demand straight from FantasyPros with customizable scoring projections
- Dashboard summaries of team-by-team positional strengths and weaknesses
- Trade Calculator (a la DFT)
- Trade Finder (which is also now supported over at DFT as well)

FP Redraft Rankings		position ▾					
owner	QB	RB	WR	TE	PICK	Grand Total	
The God Formerly Known As M.L.	8.03%	10.52%	7.98%	12.66%	9.56%		
Cells	13.84%	8.15%	6.35%	14.76%	9.27%		
Pearlman Panthers	10.9%	9.63%	6.47%	15.9%	8.99%		
King in the North	11.08%	9.63%	6.99%	6.81%	8.74%		
Red Rockets	6.71%	6.57%	12.10%	9.79%	8.70%		
Pinadipahla	6.71%	8.97%	9.43%	6.81%	8.45%		
Enbee.Wait For It.Ldary	10.27%	4.87%	11.48%	9.17%	8.38%		
Boogie Mays/Swag Carnival	9.64%	6.57%	9.85%	7.51%	8.23%		
Of My Loven, You Must Get	6.71%	9.50%	8.45%	5.15%	8.15%		
King Dopey	8.32%	10.30%	5.68%	6.30%	8.04%		
Mr. Cerberus/McGibblets	8.03%	8.05%	12.68%	7.38%	7.69%		
Agents of Chaos	3.24%	7.24%	5.49%	4.64%	5.68%		
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%		

FP Dynasty Rankings		position ▾					
owner	QB	RB	WR	TE	PICK	Grand Total	
Agents of Chaos	2.20%	11.18%	9.18%	1.31%	15.76%	9.66%	
King in the North	10.57%	7.82%	8.71%	2.69%	17.77%	9.24%	
Let's Wait For It.Ldary	2.83%	4.73%	12.68%	7.38%	6.57%	8.84%	
King Dopey	20.28%	11.85%	5.27%	2.49%	14.04%	8.48%	
Pinadipahla	11.03%	11.50%	7.99%	3.49%	6.97%	8.84%	
Red Rockets	8.34%	2.94%	12.65%	7.71%	6.97%	8.75%	
Mr. Cerberus/McGibblets	6.53%	12.41%	4.70%	7.01%	14.04%	8.15%	
Pearlman Panthers	6.46%	10.13%	6.43%	22.07%	3.99%	8.02%	
Boogie Mays/Swag Carnival	4.89%	2.12%	12.46%	10.24%	2.74%	7.88%	
Of My Loven, You Must Get	2.28%	9.20%	8.14%	1.83%	5.24%	7.47%	
The God Formerly Known As M.L.	2.31%	7.57%	8.73%	9.59%	1.58%	7.30%	
Grand Total	22.32%	8.56%	3.11%	24.24%	3.99%	6.94%	
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

- This is currently designed to support one-QB *AND* two-QB offense-only leagues.
- Having kickers, defensive teams, or IDP won't break the sheet, but no values are generated.

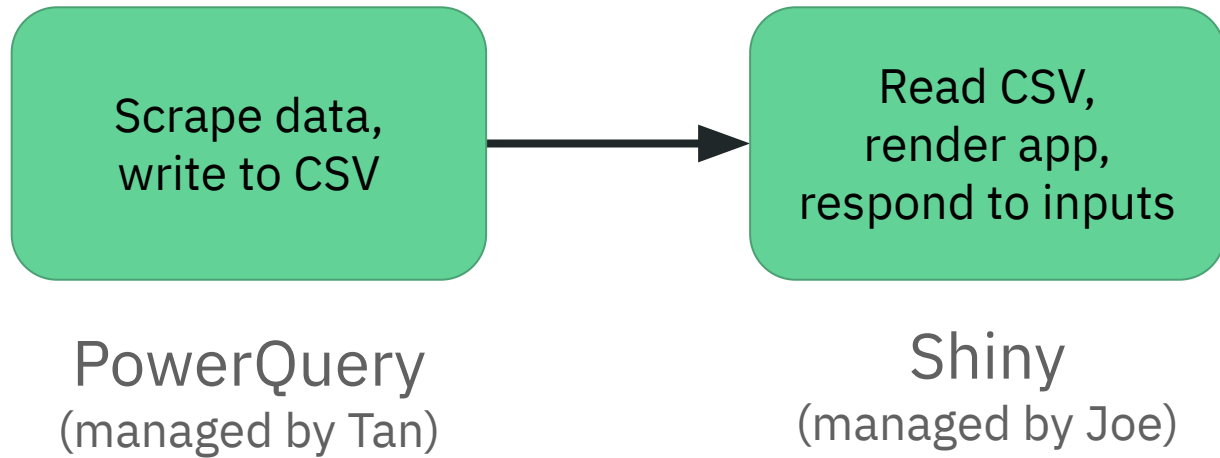
- This spreadsheet is built on Excel for Windows and requires the PowerQuery add-in (instructions here). This means it requires Excel 2010 or later. There are no plans to support Macs, unfortunately.

### Follow Us on Twitter!

[illegible]

Hayes/Album	Artist	Genre	Age	position	Pos	PostRank	Best	Worst	Age	3rd	Drop
ROSTER	King of the Hill	KNTH	26	NR	NVG	1	1	5	19	14	9916
ROSTER	Let My Love Go: Must Get	LAZY	26	NR	NVG	1	1	5	19	14	9916
ROSTER	King Droopy	KDNY	26	NR	21	FB	DAL	1	6	36	17
ROSTER	Mr. Criminals: MicRobots	MR	26	NR	NVG	1	1	5	19	14	9916
ROSTER	Flapdoodle	FLP	26	NR	PTL	3	2	9	48	19	9005
ROSTER	The Good Foremen Know As JM	JAL	26	NR	ATL	4	1	5	18	5	1801
ROSTER	Private	PRVT	26	NR	LA	1	1	5	19	14	9916
ROSTER	Red Rooters	RBRK	22	NR	OKC	5	5	19	9	32	8015
ROSTER	Logans: Walk To The Library	LOG	24	NR	CIN	1	1	5	19	14	9916
ROSTER	Agents of Chaos	AGCH	24	NR	HOU	7	6	10	35	3	7661
ROSTER	Permanent Partners	PNTR	24	NR	OKC	5	5	19	9	32	8015
ROSTER	My Little Pony: Sweet Carnival	MLP	23	NR	JAC	1	1	5	19	14	9916
ROSTER	Bookies: Miss Swing Central	BMSC	27	NR	IND	10	11	28	152	43	6005
ROSTER	With	WTH	27	NR	LA	1	1	5	19	14	9916
ROSTER	The Good Foremen Know As JM	JAL	23	NR	BUF	11	13	38	188	7	5915

# DynastyProcess v0.1 architecture, 2019





Internet Archive Wayback Machine  
https://web.archive.org/web/20200123231349/https://apps.dynastyprocess.com/calculator/  
16 captures  
7 Dec 2019 - 1 Dec 2021

DynastyProcess.com Database Calculator Rookie ADP More Awesome Apps

## DynastyProcess.com Trade Calculator

About

One of our flagship apps, the DynastyProcess.com Trade Calculator features unparalleled control of trade values built on [FantasyPros Dynasty Ranks](#). Here's a quick rundown of what you can customize:

- QB Mode toggles between the base 1QB values and the DynastyProcess.com algorithm-generated 2QB values.
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- Startup Mode adds labeling so that you can assess the value of startup picks, and can also include placeholder picks for a separate rookie draft.

For more information about the values, please check out the [information page!](#)

Normal

Startup (Players & Picks)

Startup (Players Only)

1QB Mode

|||

12 Teams

Download Values

Studs-Heavy

Depth-Heavy

Pick Skeptic

Pick Optimist

Team A:

Team B:

*DynastyProcess Shiny app v1, ~ March 2019*

*(thank you Wayback Machine)*



*infamous Reddit hug of death*

# dynastyprocess.com

Monitor security and performance for dynastyprocess.com. Configure products and services from the menu.

[Review Cloudflare fundamentals](#)

24 Hours 7 Days **30 Days**

10 SEPTEMBER — 10 OCTOBER

Unique Visitors

**102.98k**



Total Requests

**2.44M**



Percent Cached

**0.06%**



Total Data Served

**94 GB**



Data Cached

**54 MB**



[View more analytics](#)

[Download data](#) ►

*timeskip to 2024:*

*still a hundred thousand  
unique monthly users, all on  
Shiny!*

what lessons have I learned from  
building and scaling DynastyProcess?

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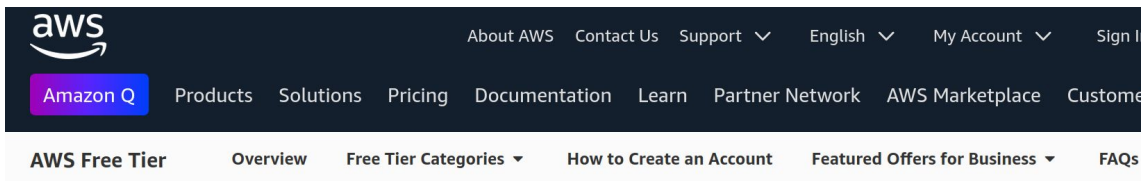
**learn to run your  
own Shiny server**

# reddit eats active hours for breakfast

shinyapps.io by Posit

FREE	STARTER	BASIC
<b>\$ 0</b> /month	<b>\$ 13</b> /month ( or \$145/year )	<b>\$ 49</b> /month ( or \$550/year )
New to Shiny? Deploy your applications for FREE.	More applications. More active hours!	Take your users to the next level!
5 Applications	25 Applications	Unlimited Applications
25 Active Hours	100 Active Hours	500 Active Hours
✓ Community Support	✓ Premium Email Support	✓ Performance Boost
		✓ Premium Email Support

# free / low cost servers are plentiful...



## Free Product Offers

Build compute solutions using these product offers from the AWS Free Tier.

PRODUCT	DESCRIPTION	FREE TIER OFFER DETAILS
<a href="#">Amazon EC2</a>  Elastic Cloud Computing	Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides secure, resizable compute capacity in the cloud.	<b>12 MONTHS FREE</b>  <b>750 hours</b> per month of Linux, RHEL, or SLES t2.micro or t3.micro instance dependent on region  <b>750 hours</b> per month of Windows t2.micro or t3.micro instance dependent on region

<https://aws.amazon.com/free/compute/>

# free / low cost servers are plentiful...

The screenshot shows the Google Cloud website's 'Free Tier products' section. At the top is the Google Cloud navigation bar with links for Overview, Solutions, Products, Pricing, Resources, and Contact Us. A search icon, Docs, Support, and a language dropdown set to English are also present. Below the navigation bar, the heading 'Free Tier products' is centered. A disclaimer states: 'There is no charge to use these products up to their specified free usage limit. The free usage limit does not expire, but is subject to change. Available for eligible customers.' Below this, eight product cards are displayed in a 2x4 grid. Each card includes the product name, a brief description, the free usage limit, and a blue arrow pointing right.


Product	Description	Free Usage Limit
<b>Compute Engine</b>	Scalable, high-performance virtual machines.	1 e2-micro instance per month
<b>Cloud Storage</b>	Best-in-class performance, reliability, and pricing for all your storage needs.	5 GB-months Standard Storage
<b>BigQuery</b>	Fully managed, petabyte scale, analytics data warehouse.	1 TB queries per month
<b>Google Kubernetes Engine</b>	One-click container orchestration via Kubernetes clusters, managed by Google.	One Autopilot or Zonal cluster per month
<b>Cloud Run</b>	A fully managed environment to run stateless containers, build apps, or host and deploy websites.	2 million requests per month
<b>Cloud Build</b>	Fast, consistent, reliable builds on Google Cloud.	120 build-minutes per day
<b>Operations (formerly Stackdriver)</b>	Monitoring, logging, and diagnostics for applications on Google Cloud.	Monthly allotments for logging and monitoring
<b>Firestore</b>	NoSQL document database that simplifies storing, syncing, and querying data for apps.	1 GB storage

<https://cloud.google.com/free?hl=en>



# free / low cost servers are plentiful...

[New: GenAI Platform Early Availability, Sign-up Here →](#)[Blog](#)[Docs](#)[Get Support](#)[Contact Sales](#)

Products ▾Solutions ▾Developers ▾Partners ▾PricingLog inSign up

[← Back to overview](#)

[Basic](#)

CPU-Optimized

General Purpose

Memory-Optimized

Storage-Optimized

Additional product pricing

FAQ

## Basic Droplets

Basic Droplets have the most efficient CPU usage at a lower cost for workloads that underuse dedicated threads. They're ideal for bursty applications that can handle variable levels of CPU.

CPU OptionsRegularPremium IntelPremium AMD

Memory	vCPU	Transfer	SSD	\$/hr	\$/mo	
512 MiB	1 vCPU	500 GiB	10 GiB	\$0.00595	\$4.00	→
1 GiB	1 vCPU	1,000 GiB	25 GiB	\$0.00893	\$6.00	→
2 GiB	1 vCPU	2,000 GiB	50 GiB	\$0.01786	\$12.00	→
2 GiB	2 vCPUs	3,000 GiB	60 GiB	\$0.02679	\$18.00	→
4 GiB	2 vCPUs	4,000 GiB	80 GiB	\$0.03571	\$24.00	→
8 GiB	4 vCPUs	5,000 GiB	160 GiB	\$0.07143	\$48.00	→
16 GiB	8 vCPUs	6,000 GiB	320 GiB	\$0.14286	\$96.00	→

<https://www.digitalocean.com/pricing/droplets#basic-droplets>

# free / low cost servers are plentiful...

**HETZNER** Dedicated ▾ Cloud Web & Managed ▾ Colocation Storage ▾ Services ▾

Overview Prices Locations Features API FAQs [Sign Up](#)

Pay only for the hours you use, if you have a server for less than a month. No minimum contract period required!

Shared vCPU Intel® Shared vCPU AMD Shared vCPU Ampere® Dedicated vCPU

VPS with AMD EPYC™ 7002 series processors.

LOCATION

USA ▾ HIL ASH

Primary IPv4 IPv6 only save € 0.50

	VCPU	RAM	NVME SSD	TRAFFIC INCL. ⓘ	IPv4	HOURLY ⓘ	MONTHLY
CPX11	2	2 GB	40 GB	20 TB	✓	€ 0.0071	€ 4.35 <small>/max.</small>
CPX21	3	4 GB	80 GB	20 TB	✓	€ 0.0120	€ 7.55 <small>/max.</small>
CPX31	4	8 GB	160 GB	20 TB	✓	€ 0.0219	€ 13.60 <small>/max.</small>
CPX41	8	16 GB	240 GB	20 TB	✓	€ 0.0417	€ 25.20 <small>/max.</small>
CPX51	16	32 GB	360 GB	20 TB	✓	€ 0.0880	€ 54.90 <small>/max.</small>

<https://www.hetzner.com/cloud/>

# servers are a bit of fuss to configure

- Domains & DNS
- Firewalls
- SSH keys
- Linux & shell commands
- Linux dependencies
- R dependencies
- Shiny server configs
- Nginx
- SSL
- load balancing
- cron jobs
- ... and more!

# servers are a bit of fuss to configure

a handful of guides that I recommend:

- [Charles Bordet](#) guide is my favourite (esp for AWS)
- [Dean Attali](#) the OG guide
- Alex Gold's [DevOps for DS book](#)
- Video by yours truly -> (and notes [here](#))

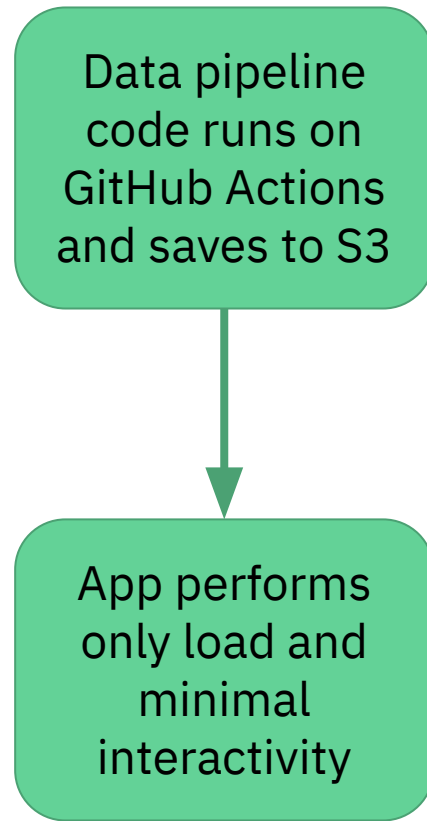


you're probably  
making Shiny do  
too much work



- Every line of code in your Shiny server block gets run at least once,, each and every time a user visits the page
- The less time it takes to run that code, the faster your app will feel

**solution: move  
computation to  
an external layer**



**solution:**  
**data.table is fast,**  
**fast is worth it**

---

*(even if it's hard to read  
and hard to think through -  
try using the pipe and a lot  
of comments!!)*



**solution:**  
**use a CDN to**  
**cache files and**  
**images**

- Cloudflare
- AWS/DigitalOcean buckets



**solution:**  
**consider caching**  
**on user inputs**

*(ie memoise)*

(only if it makes sense,  
this can also make your  
life harder!)

**logging pays  
dividends**

# logging is proactive debugging

Setting up good logging can help you fix bugs quickly!



[tanho.ca/logging-shiny](https://tanho.ca/logging-shiny)

---

**the most useful  
apps help you  
make a decision**

# relative success of DynastyProcess apps

**RAW  
DATABASE**



**PLAYER  
SIMILARITY**



**IS MY  
TEAM GOOD**



**SHOULD I  
MAKE THIS TRADE**



**tailor your user  
experience**

*hmm, which users should I be designing my app for?*

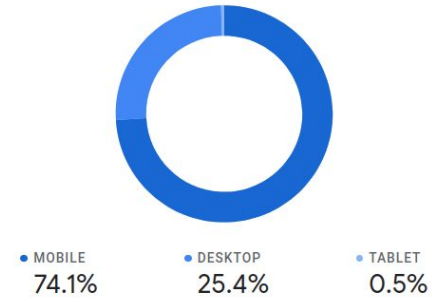


Analytics

All accounts > Tan Hoang Ho

DynastyProcess Apps - GA4

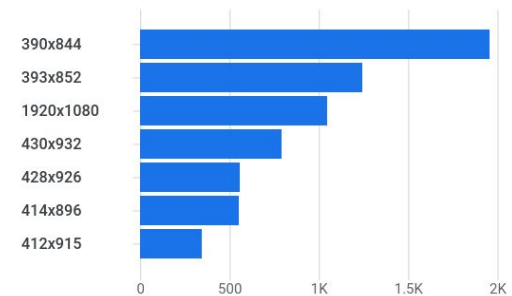
Active users by Device category



[View device categories](#) →

Active users by Screen resolution

Platform exactly mat...



[View screen resolutions](#) →



← → ↺

https://web.archive.org/web/20200123211349/https://apps.dynastyprocess.com/calculator/

120%

Go

DEC 23 2019

JAN 2020

NOV 2021

About this capture

Wayback Machine

16 captures

7 Dec 2019 - 1 Dec 2021

DynastyProcess.com

Database

Calculator

Rookie ADP

More Awesome Apps

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Startup (Players & Picks)

Startup (Players Only)

1QB Mode

|||

12 Teams

Download Values

Studs-Heavy

Depth-Heavy

Pick Skeptic

Pick Optimist

-0.03 -0.029 -0.028 -0.027 -0.026 -0.025 -0.024 -0.023 -0.022 -0.021 -0.02

-0.024

-0.02

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

0

0.8

1

Team A:

Team B:

v1: before redesign, 2019-2020

v2, ~2021:  
redesigned for mobile,  
including some sweet PWA action

(eternally grateful to David  
Granjon for his work on  
shinyMobile)

**Net effect:**  
**jump from 40k monthly users in**  
**2019-2020 to ~ 200k monthly**  
**users by end of 2021 (!)**

---



**leverage what you  
know about your  
users**

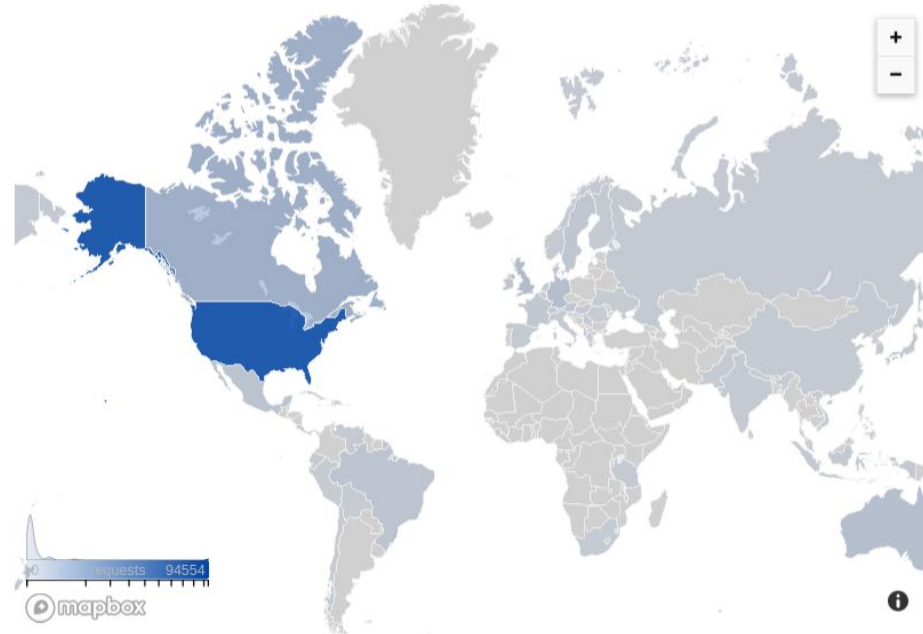
anything  
interesting in  
this web traffic  
plot?



yup, it's a big US  
audience  
*(shocker)*

### Web Traffic Requests by Country

Previous 24 hours



cheap & dirty  
cost savings:  
reduce compute  
power at night

apps-calculator / dev / scaling.R

Code

Blame

49 lines (36 loc) · 1.44 KB



Raw



```
9   scale_app <- function(n_containers){
21     dpcalc_id <- "39852dd6-dddb-4337-ad2d-e70de1933cda"
22
23     json_spec <- list(spec = app_spec) |>
24       jsonlite::toJSON(auto_unbox = TRUE)
25
26     update_req <- httr::PUT(paste0(do_baseurl, "apps/", dpcalc_id),
27                           do_auth(),
28                           body = json_spec)
29
30     httr::stop_for_status(update_req)
31
32     force_redeploy <- httr::POST(paste0(do_baseurl, "apps/", dpcalc_id, "/deployments"),
33                                do_auth(),
34                                body = list(force_build = TRUE) |>
35                                  jsonlite::toJSON(auto_unbox = TRUE)
36                                )
37
38     httr::stop_for_status(force_redeploy)
39     |
40     invisible(NULL)
41   }
42
43   run_hour <- lubridate::hour(lubridate::with_tz(Sys.time(), tzzone = "America/Toronto"))
44
45   # if it's after 9 am and before 10pm, three containers else one container
46   n_containers <- ifelse(run_hour >= 9 & run_hour < 22, 3, 1)
47
48   scale_app(n_containers)
```

saves  $\frac{2}{3}$  of cost  
each night (~8h),  
aka ~ 20%

## Insights

[Learn](#)

Select Object



App



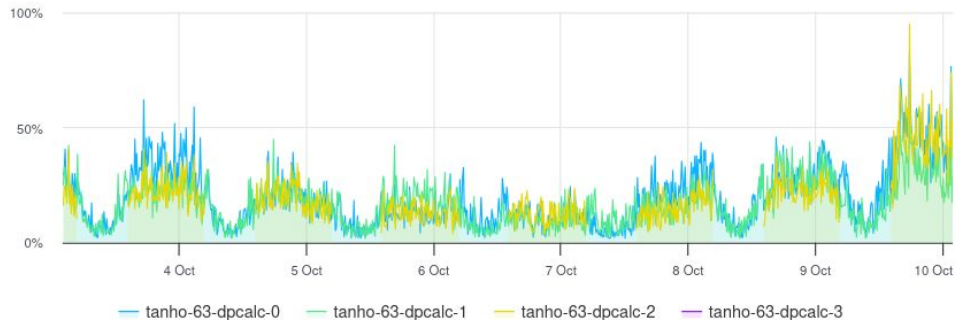
Select Period

Last 7 days

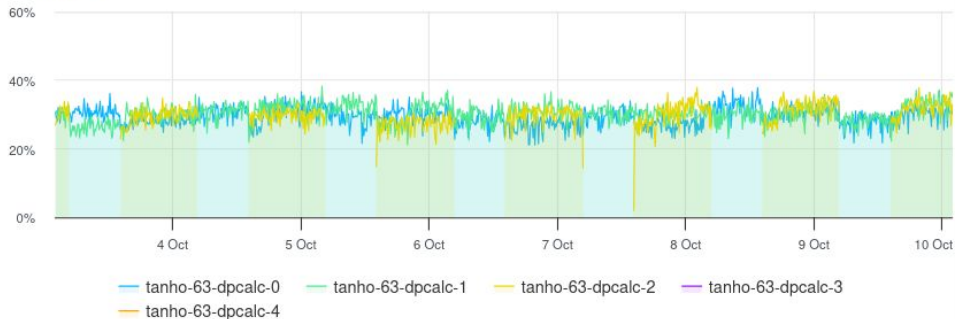


### Compute

#### CPU %



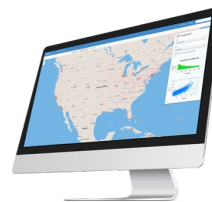
#### Memory %



**start from where  
you are, there's so  
much to learn**



# first iteration of the “stack”



shinyapps.io



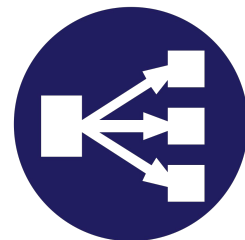
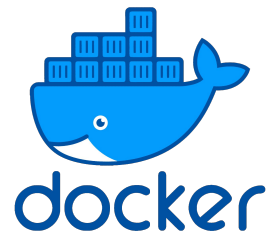
graduate to  
better tech  
when you need  
it



rstudio/shiny-  
server

Host Shiny applications over the web.

26 Contributors 176 Issues 714 Stars 289 Forks

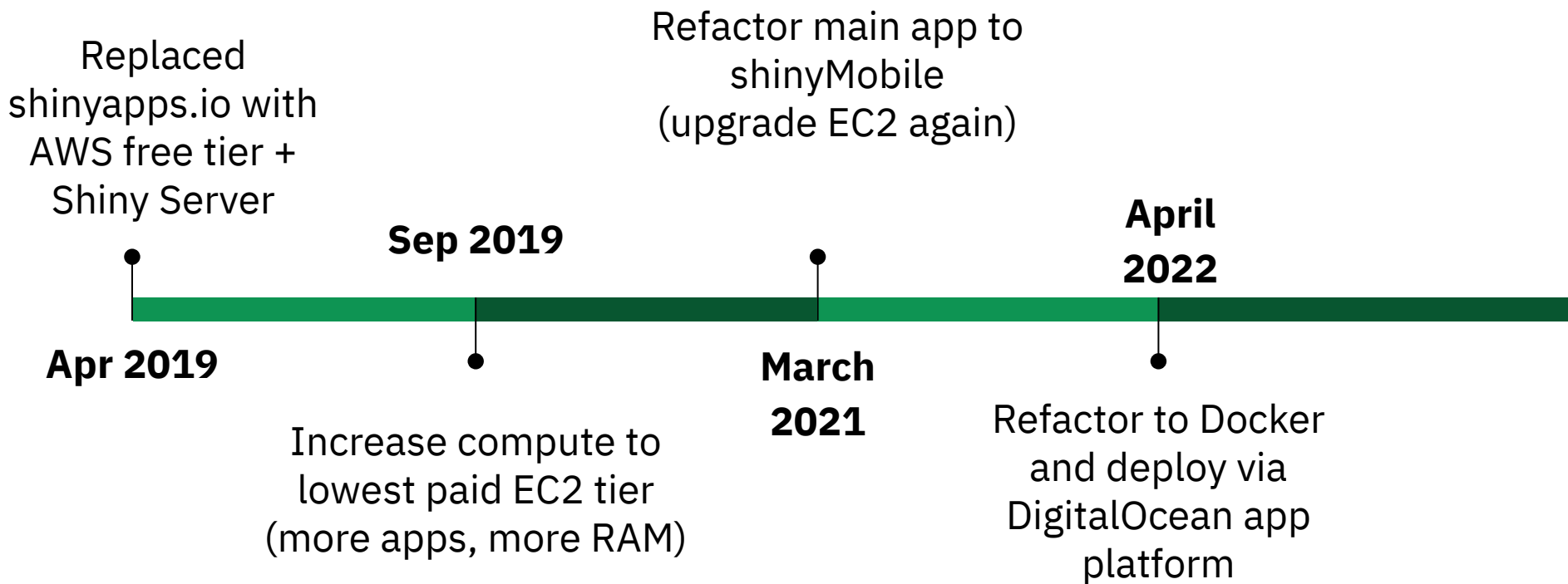


ShinyProxy



kubernetes

# A timeline of DynastyProcess architecture



# Recap

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# Lessons Learned From DynastyProcess

- Run your own server (at least once)
- You're probably making Shiny do too much work
- Logging pays dividends over time
- The most useful apps help you make a decision
- Tailor UX to your users
- Leverage what you know about your users
- Start from where you are, there's so much to learn

# DynastyProcess today

- Maintenance mode since ~ mid 2022, gradually approaching a sunset date as both developer and user interest fades
- Long since been surpassed by competitors from a features and performance perspective (deservingly so)
- Joe became a Data Scientist for Pinnacle, a sports betting company
- Tan became a ML Engineer for Zelus Soccer, helping pro soccer clubs make better recruitment decisions

# Thank you!

If you liked this talk,  
we're hiring for R engineers at  
Teamworks Soccer -  
come say hi or send me an email!

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