

why I went to grad school
... and then why I left grad school
“a tale of possibilities after Trinity”

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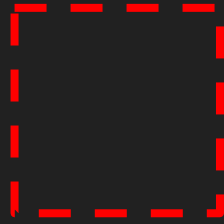
my thought
process



info about
grad school



technical stuff
(aka examples of what
you could do after Trinity)



then some key takeaways!

the year is 2017...



- year 2 of undergrad
- thought I wanted to be a bio major
- take my first CS class ever, and I had fun!
- switch my major to CS
- take a bunch more classes

the year is 2018...



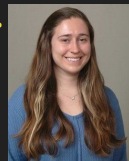
- senior thesis with Dr. Hibbs
 - “can we use neural networks for music style transfer?”
 - “Super Bass by Nicki Minaj in the style of 100 geecs?”
 - ask your professors about research!
- I’m not sure what job I want, but being a professor sounds fun
- I’m thinking of applying to grad school

how does grad school work for CS?

terminal Master's

- typically no research
- NOT paid
- classes cost money
- typically ~2 years long (varies)

★ direct to PhD ★



- research-focused
- paid via stipend (but not the big bucks)
- classes are “free”
- typically ~5-6 years long (varies)
- incidental Master's after ~2 years

PhD stipend?



terminal Master's



direct to PhD



research +

TA (stipend from teaching)



RA (stipend from research)



~ \$34k in 2018

(varies by school and other factors)

incidental Master's?



terminal Master's



direct to PhD

research +
TA (stipend from teaching)



RA (stipend from research)



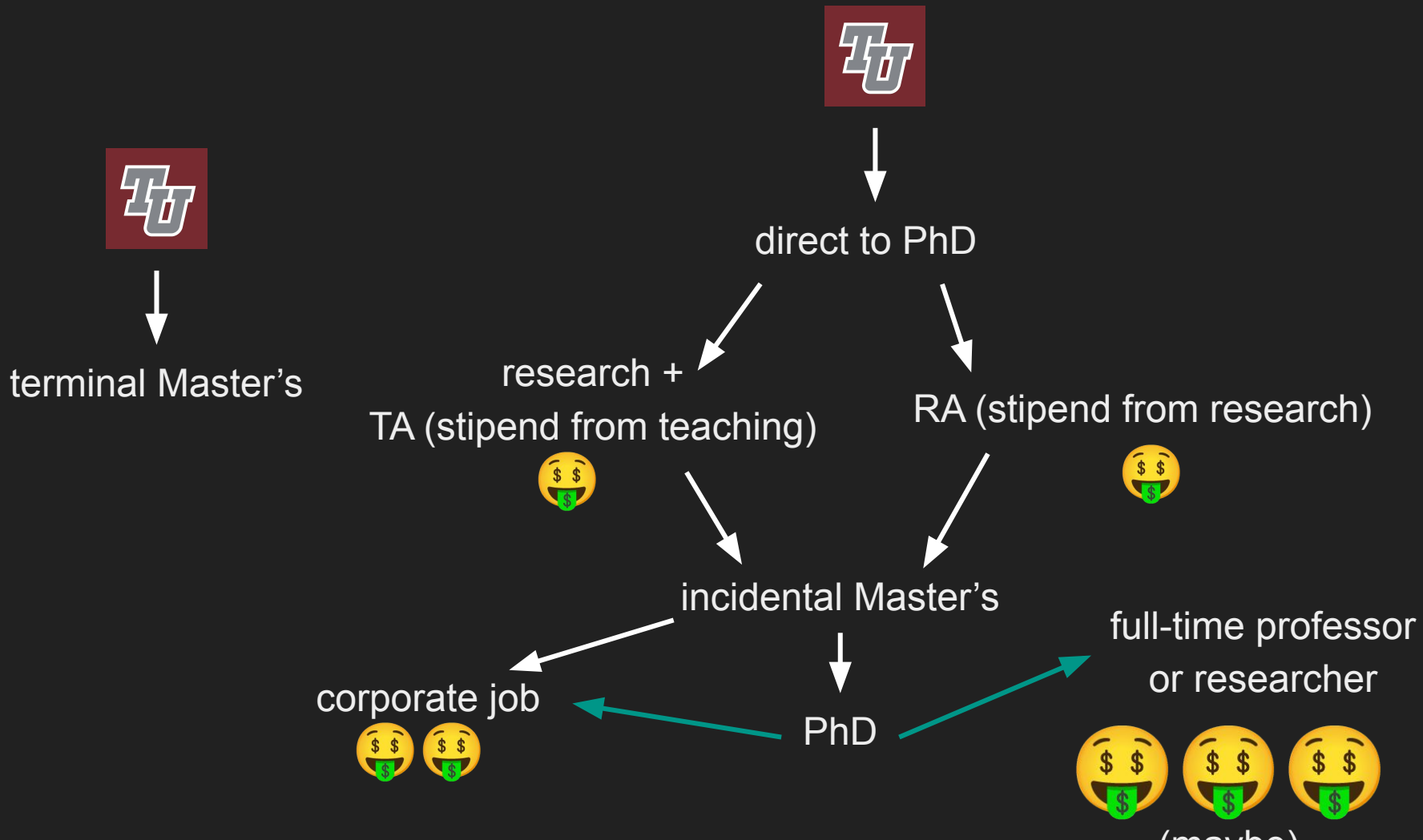
incidental Master's

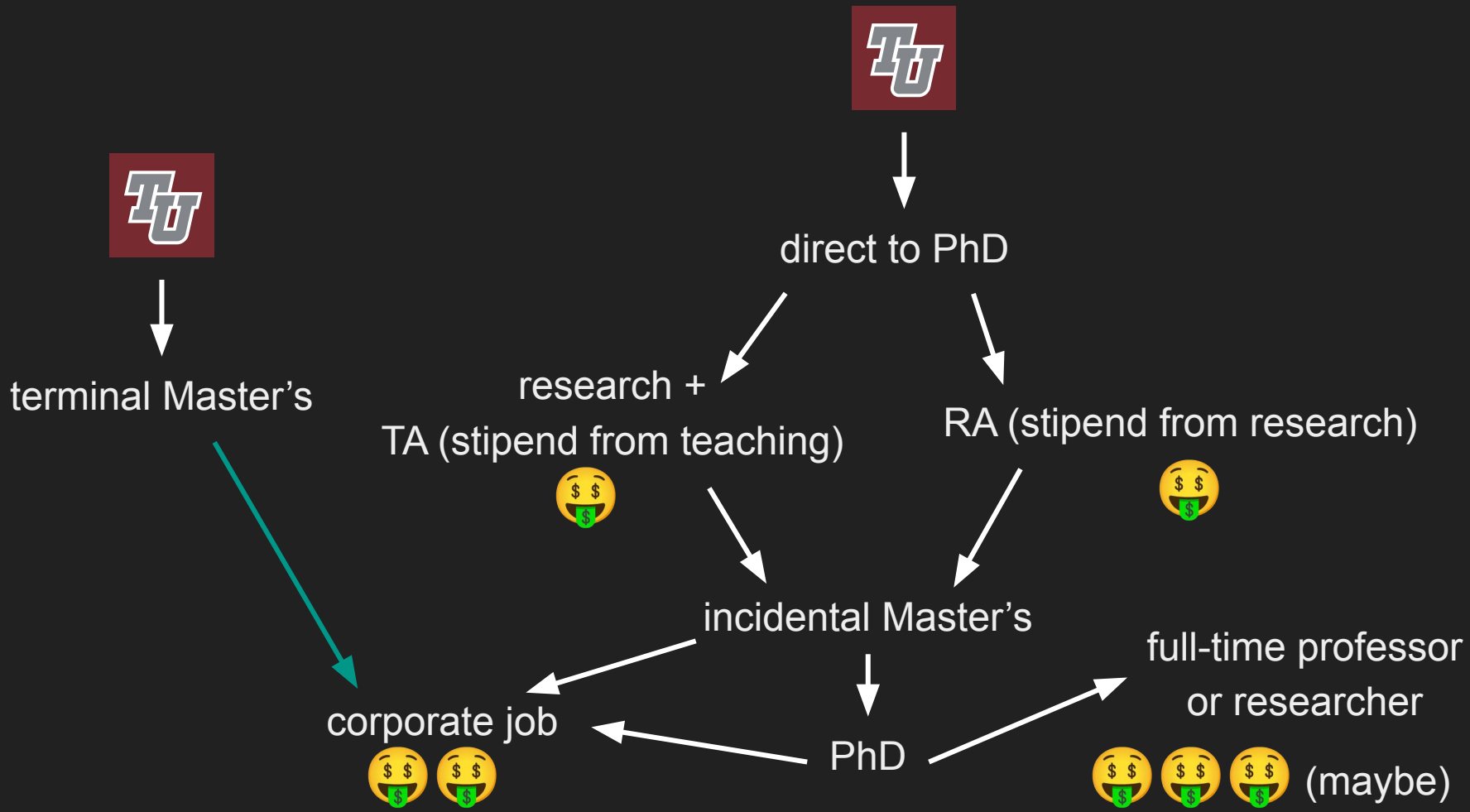
corporate job

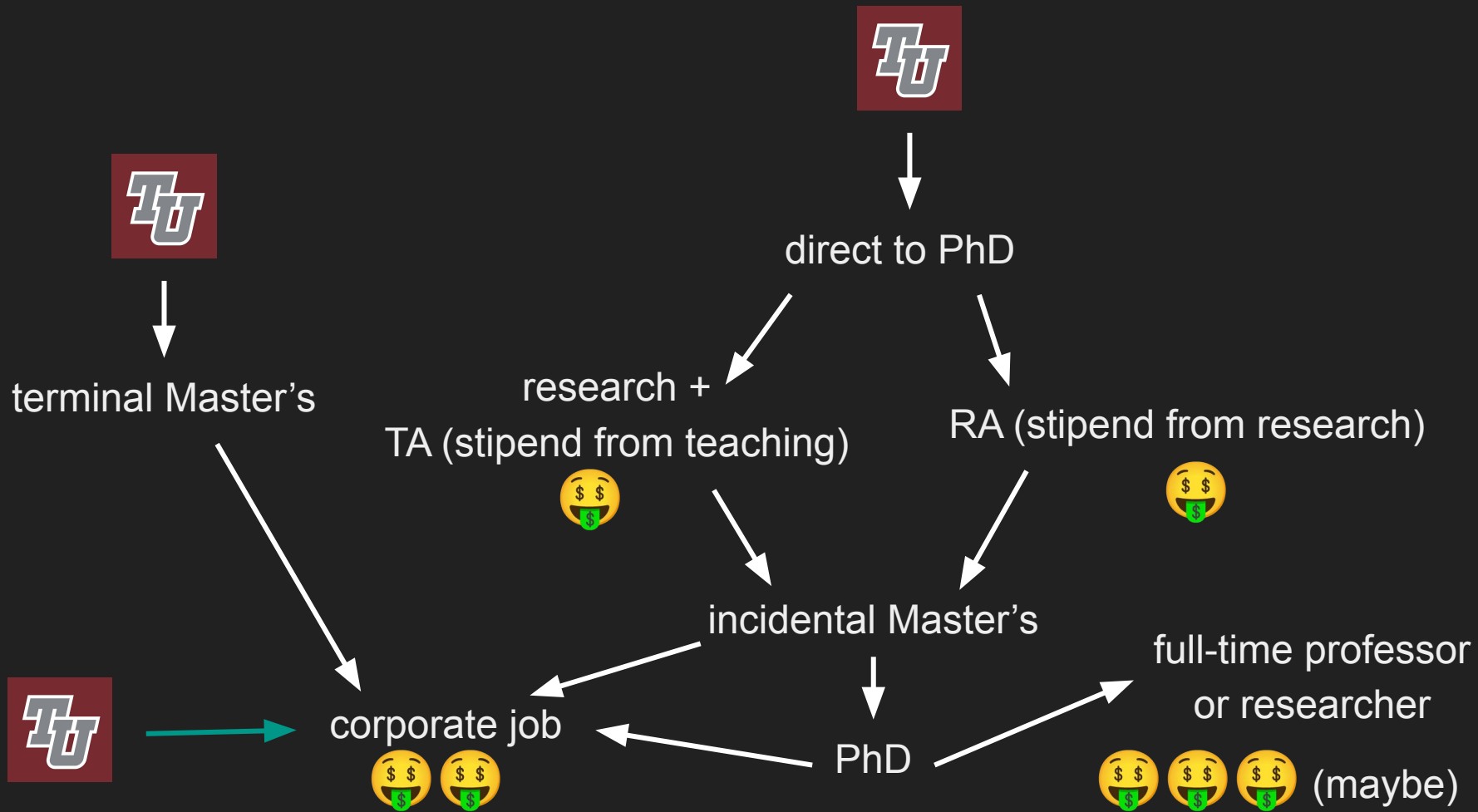


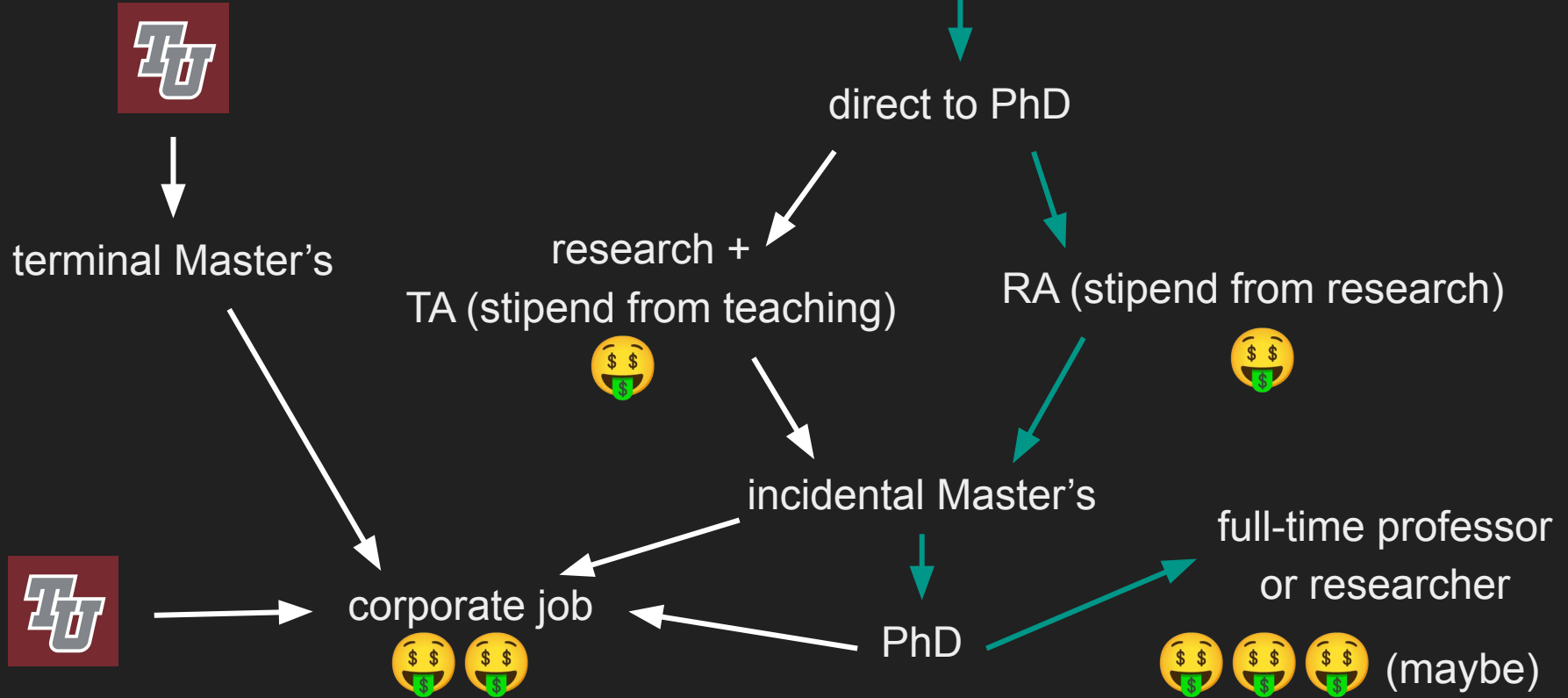
PhD

★ incidental
Master's
after ~2 years ★

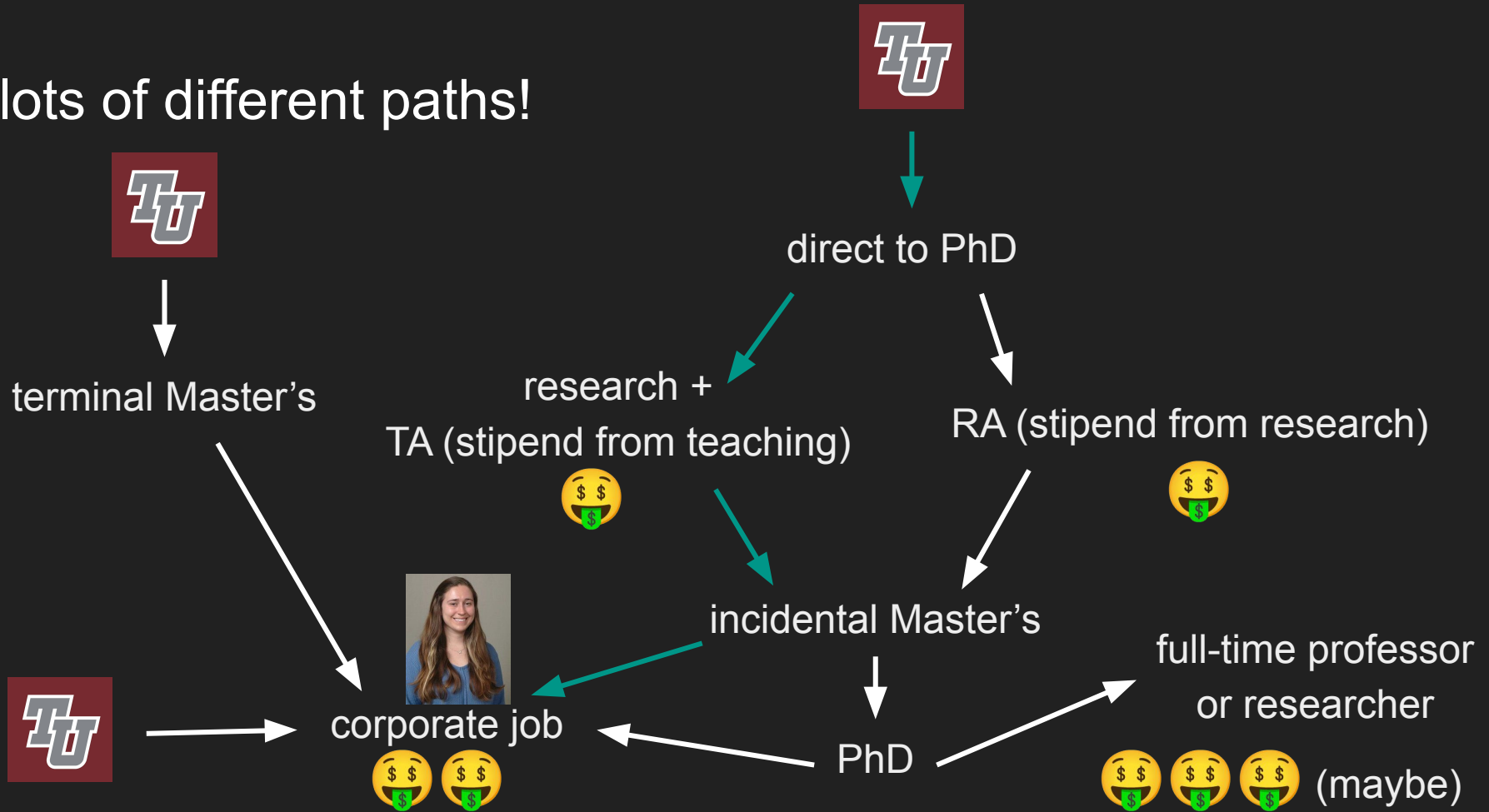




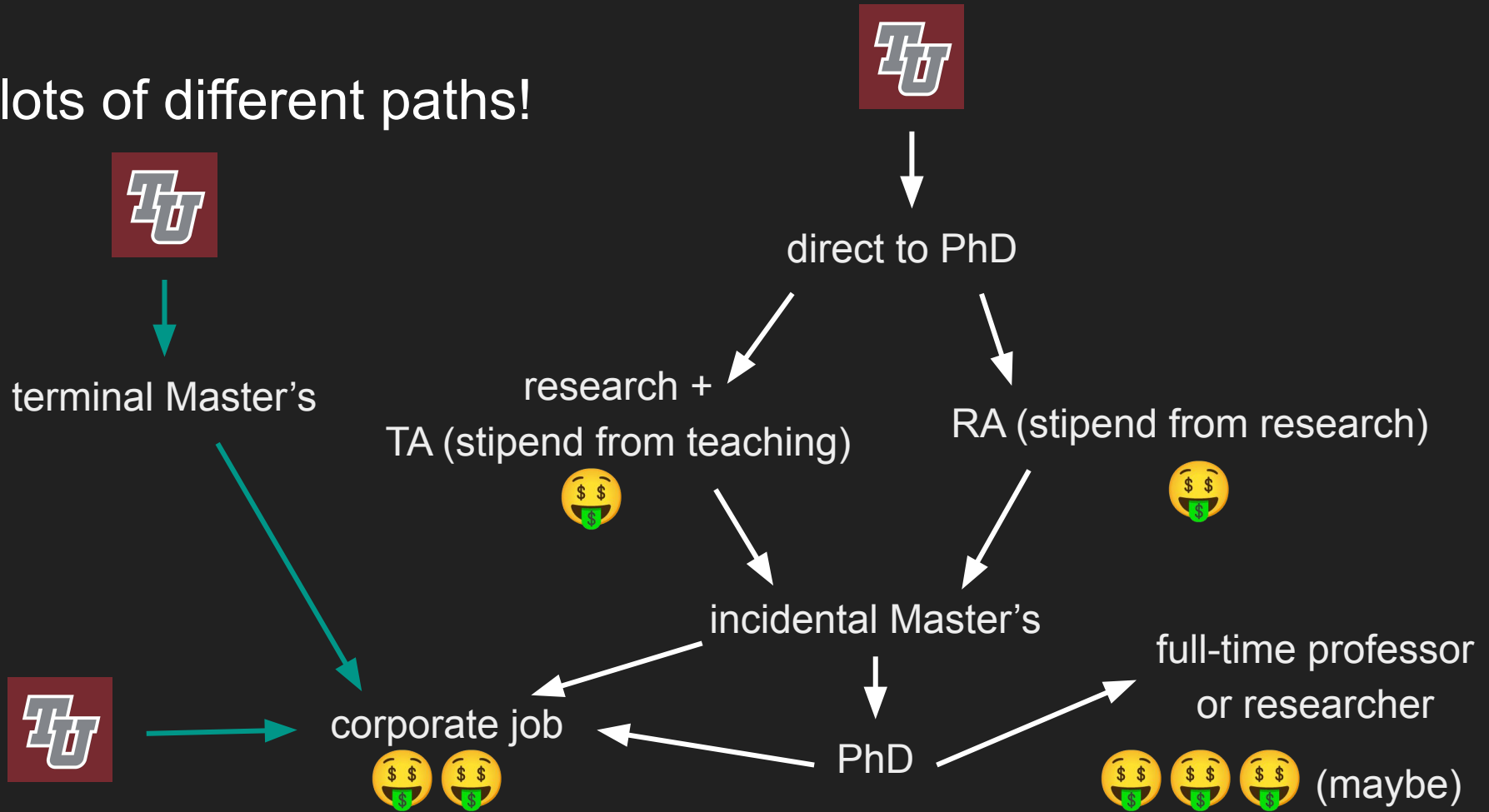




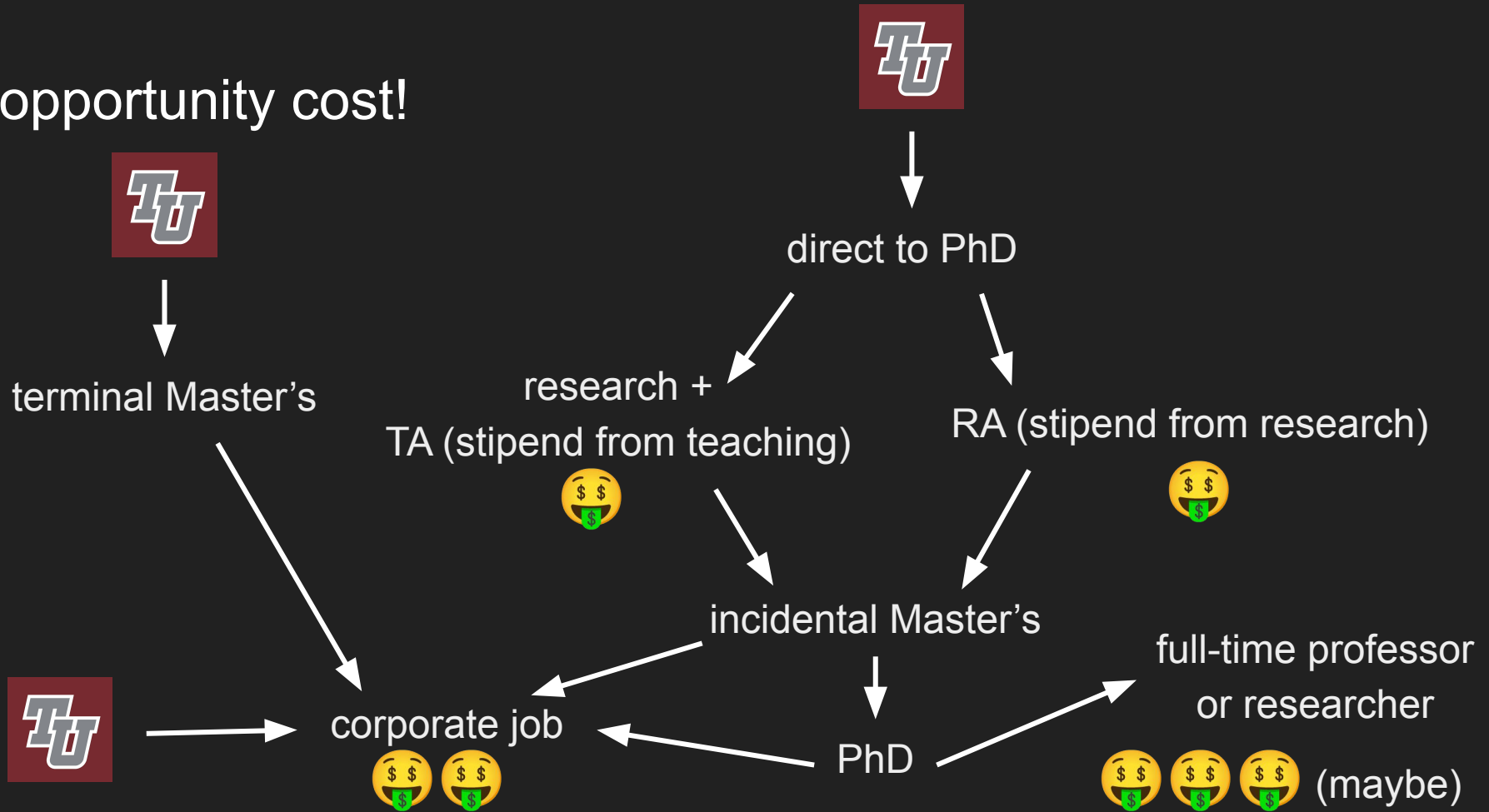
lots of different paths!



lots of different paths!



opportunity cost!



the year is 2018...



- I'm not sure what job I want, but being a professor sounds fun
- I had fun researching neural networks with Dr. Hibbs
- I apply to grad school!

grad school applications?



apply directly to program



terminal Master's



apply to program
+ apply to do research
with specific advisors



direct to PhD



choosing a PhD advisor is an important decision!

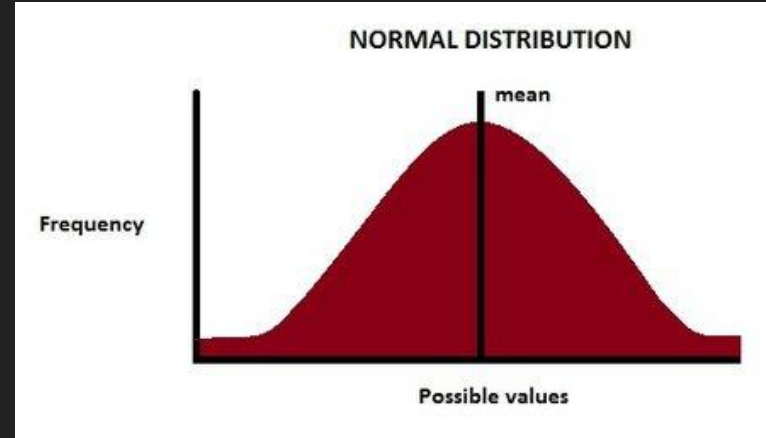
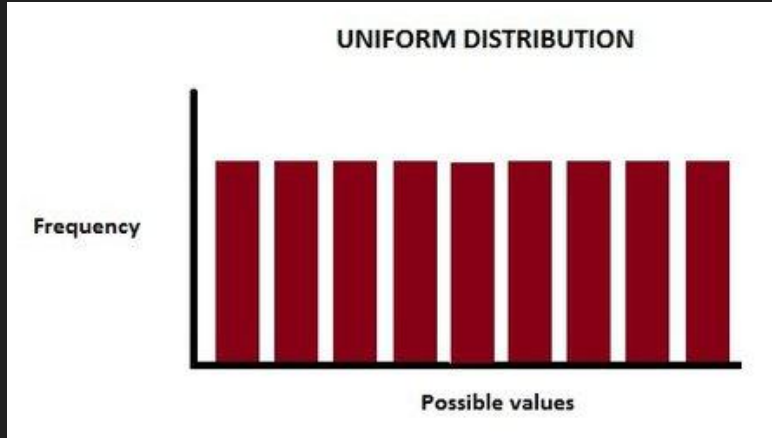
the year is 2018...



- I start my PhD at the University of Massachusetts Amherst
- researching NN (neural networks) again
- using NN to model probability distributions

what are probability distributions?

- they tell us the likelihood of different outcomes:



- statisticians use them (e.g. simulate wait times at Disneyland)
- we can query a distribution to generate a random number

what if we only have raw data?

- can we still figure out the distribution?
- staticians need to distributions as input to experiments
- we can use neural networks to "learn" the distribution, and to generate more data!

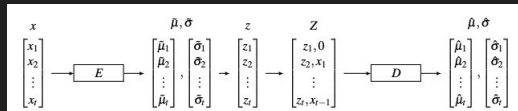


Figure 3: NIM-VL training architecture.

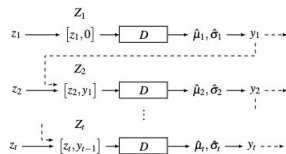


Figure 4: NIM-VL generation architecture.

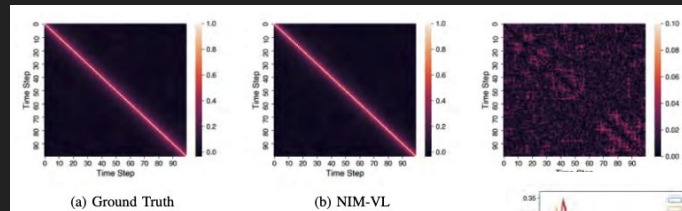


Figure 6: Empirical correlation coefficients for the ARMA/ARMA r

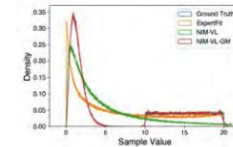


Figure 10: Empirical densities for Gamma-Uniform mixture.

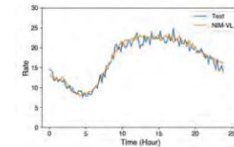


Figure 11: Empirical arrival rates for emergency-call data.

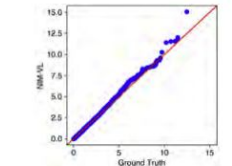


Figure 12: Q-Q plot for W_{60} distribution in a GI/G/1 queue.

the year is 2019...



- year 2 of PhD
- I'm not having fun anymore working on NN
- I was taking a PL (programming languages) class and was having fun!
- I changed PhD advisors
- researching PL design

what is PL design?

- programming languages have different designs for different uses

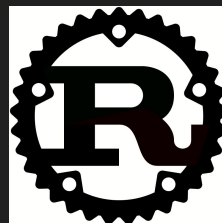


Scala






Haskell

- some need special considerations, while others are “safe”

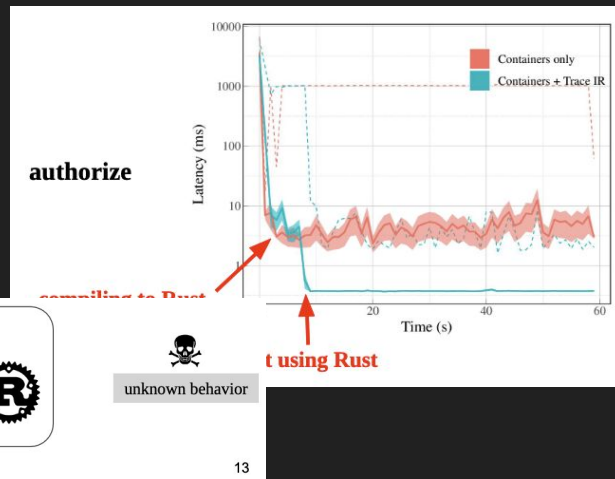
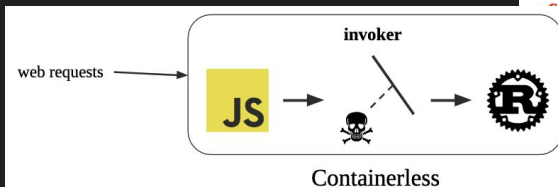


can we have both “fun” and “safe”?

- can we write  code and still get the benefits of  ?
- yes, with a JavaScript to Rust compiler!

Trace trees	
$t ::= c$	Constant
x	Variable
$t_1 \text{ op } t_2$	Binary operation
$tblk$	Block
if (t_1) t_2 else t_3	Conditionals
while (t_1) $tblk$	Loops
let $x = t;$	Variable declaration
$tlv = t;$	Assignment
$tblk$	Block
$\ell : t$	Labelled trace
 break $\ell \ t;$	Unknown behavior
env $(x_1 : a_1, \dots, x_n : a_n)$	Environment object
$*t.x$	Value in environment

34



the year is 2021...



- covid happened
- year 2.5 of PhD
- I wasn't having fun researching
- but I maybe want to a professor
- I was still having fun working on PL!
- I was on the fence, decide to start looking for the “right” job

opportunity cost!

★ incidental
Master's
after ~2 years ★



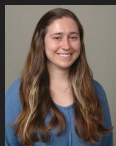
direct to PhD

research +

TA (stipend from teaching)



incidental Master's



corporate job



PhD

full-time professor
or researcher



(maybe)

the year is 2021...



- I found the “right” job and left my PhD (I no longer needed a grad degree)
- embarrassed that I “quit”
- embarrassed that I changed my mind
- I felt like I had failed
- I didn’t have a >3 year plan
- I felt uncertain for the future

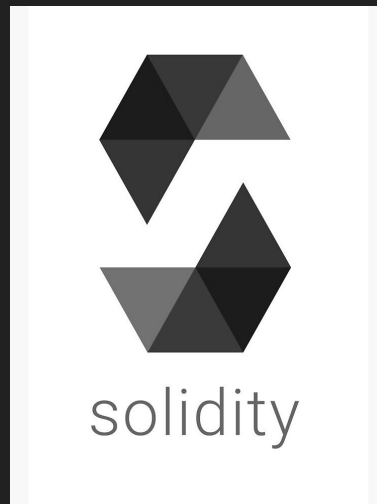
but it all turned out fine!



- I had really enjoyed my PhD experience but switching to a job felt right for me
- met amazing people
- had fun doing research
- received a Master's degree
- ★ I can always go back! ★
- I loved my new job... working in crypto!

can we improve PL design for crypto?

- building a product that improves upon Ethereum at Fuel Labs
- building a PL for crypto



can we improve PL design for crypto?

- improving things like...
- user experience
- adding domain-specific features for crypto
- compile-time and run-time error detection



Sway



other things you can do with a CS degree!

- build language models like ChatGPT
- research algorithms analysis
- improve cloud services
- build generative models for the web to improve UX
- robotics
- improve distributed systems like Ethereum

any of these sound fun?
talk to your professors!

you can do any of these either
for research or industry!

time for the key takeaways

reasons to ***DEFINITELY*** go to grad school?

- there is a topic, research question, or field that you want to devote time to
- the job that you want requires a graduate degree
- full-time professor at a college or university
- full-time researcher at a company or university



direct to PhD

reasons to **NOT** go to grad school?

- you don't enjoy doing research
- you don't need a grad degree for the job you want
- you want to start making money right away



corporate job

reasons to ***MAYBE*** go to grad school?

- you like going to school
- you don't know what job you want yet
- you haven't tried research yet but you think you would like it



terminal Master's



direct to PhD

it is ok to change your mind,
even though it might be scary

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even though it might be scary

follow the fun,
and you will always be having a good time

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ask your professors about research
if you are interested

thanks! questions?

question form:

tinyurl.com/tu-questions

email: emilyaherbert.com