

# Administrivia

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- Final exam next Tuesday in this room at 2:30pm
- No notes or devices
- Comprehensive with at most 9 problems
  - core is 5 problems on reasoning & testing
  - other problems on generics, subtypes, TypeScript
  - small problems on anything else

# US News CS Rankings

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<b>1</b>	MIT
<b>2</b>	CMU
	UC Berkley
	Stanford
<b>5</b>	UIUC
<b>6</b>	UW
	Cornell
	Georgia Tech

# Last Year in Startups

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	UW	Stanford
Funded Startups	70	465
Dedicated VC Funds	1	3

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# CSE 331

# Software Design & Implementation

James Wilcox & Kevin Zatloukal

Fall 2023

Startups

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# Not Just Business Majors

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Some prominent counterexamples...



**Microsoft**

Bill Gates & Paul Allen



**Apple**

Steve Jobs



Sergey Brin & Larry Page



**Meta**

Mark Zuckerberg



**NVIDIA**

Jensen Huang



Morris Chang

# You Can Do This

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YC's Essential Advice for Startups:

- build something people want
- launch fast & iterate
- write code & talk to users
- find 10-100 users who love it

Could become a profit or non-profit

(Write your code to be easily changeable!)

# Startups are Important

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- Startups are a critical part of the economy
  - responsible for nearly all net job growth
  - young companies perform the majority of R&D
- Obvious examples of world-changing impact
  - PCs, ecommerce, ride hailing, EVs, cheap space flight, etc.
- Most startups fail
  - about 2/3<sup>rd</sup> lose all or most money invested
  - others must increase 5-10x to get normal investment returns
- “Expected to fail” path is not as scary as it sounds...

# Founders Take Little Risk

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- Startups are corporations (C corps)
- Corporations have “limited liability”
- In the event of bankruptcy
  - creditors split up the *corporation's* assets
  - creditors do not get founder's personal assets
- You can only lose the money you put in



# Founders Take Little Risk

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- “Founder of X” looks great on a resume
  - even when the company failed
  - demonstrates grit, risk-taking, leadership, etc.
  - requires you to learn a lot of different skills
- “Founder of X, Acquired by Y” looks even better
  - but the first part is already good
- A personal example...

# Founders Take Little Risk

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- Asymmetric risk/reward
  - cannot lose more than you put in
  - can make a lot more than that
    - money, respect of peers, impact on world, etc.
- Forming a startup looks great on a resume
- Joining an existing startup also has benefits
  - more learning
  - more opportunity for rapid advancement
  - (this was my path after UW)

# Next Steps

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Suppose you built something that people want

Now, you want to

- work on it full time
- hire other people to help
- buy necessary equipment / services

Then, you will need to raise money

# Places to Raise Money

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1. Friends & Family (when possible)
  - no one will give you better terms
2. Grants
  - UW has CoMotion (and other programs)
  - particularly available to those where #1 does not apply
3. Users
  - if they love it, they'll often pay for / donate to it
  - paying customers are proof that users love it
4. Investors...

# Need Funding Until Profitable

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Revenue	money earned	Top Line
<u>– Expenses</u>		
= Income	profit	Bottom Line

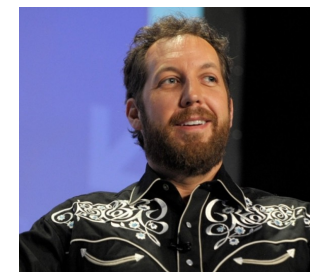
- Almost every company loses money initially
  - new companies (“startups”) need to raise money
- Once you are profitable, you control your own destiny
  - non-profits usually raise money forever

# Funding Rounds

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Pre-seed	angels / accelerators
Series Seed	+ VC firms
Series A	+ institutions
Series B	...
...	
IPO	public market investors
Debt	banks / investors

- Each stage is less risky than previous



# Company Stages (a16z)

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Pre-seed

Series Seed

Series A

Series B

...

IPO

Debt

Product stage

- finding product / market fit

Growth stage

- taking market share

Operations stage

- improving margins & efficiency

# Company Stages (a16z)

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Pre-seed

Series Seed

Series A

...

} Product stage

– finding product / market fit

- Founders of businesses raising Series A/B rounds...
  - will typically be millionaires on paper
  - will have lots of help from their investors
- Let's just focus on the product stage



# Series A/B Funding

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- Established clear “product / market” fit (PMF)
  - lots of paying customers
    - e.g., \$1m in annual recurring revenue
  - core group of customers that *love* the product
    - high engagement
- Raising money to switch into growth mode
  - hire more people to expand the product
  - spend on advertising and marketing
  - capture market share before bigger competitors arrive

# Pre-Seed & Seed Funding

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	Pre-seed	Seed
Funding amount	Typically between \$500k – \$1m	Typically between \$2m – \$5m depending on industry.
What you've shown	<ul style="list-style-type: none"><li>• You've created a minimally-viable product that works in some way.</li><li>• You've identified a clear market and a pathway to that market with your product.</li></ul>	<ul style="list-style-type: none"><li>• You've demonstrated some kind of product-market fit and traction.</li><li>• You've assembled a high-quality team to build out the company.</li></ul>
Normal valuation	Typically \$1M - \$3M, depending on industry.	Typically \$5M - \$15M, depending on industry.
Target runway	3 to 9 months	12 to 18 months
Typical investors	Friends and family, accelerators	Angel and institutional investors

from [brex.com](https://www.brex.com) (numbers updated for 2022)

# Steps in the Product Stage

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- Minimally-viable product
  - can raise pre-seed funding
- Some evidence of PMF / traction
  - can raise seed funding
- Clear evidence of PMF (e.g., \$1m in ARR)
  - can raise series A/B funding
- Various forms of evidence of PMF
  - paying customers, waiting lists, letters of intent, etc.

# Raising Money

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- Each funding round is to help get to the next round
  - have a plan for how the money will accomplish that
- External funding can start with pre-seed round
  - if you can wait longer, you should
- Expect to sell 20-30% of the company in each round
  - “dilution” of earlier investors
  - each round usually includes an option pool
    - used to hire & replenish the founders’ stake

# Funding Rounds Sizes (Median)

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Pre-seed	hundreds of thousands
Series Seed	low single-digit millions
Series A	high single-digit millions
Series B	tens of millions
...	

- What if you're not comfortable raising such amounts?
  - there are ways to raise smaller amounts (more later)
  - you also might be misunderstanding the relationship between founders and investors

# Raising Money

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- An old saying in finance:
  - When you owe the bank \$100, that's your problem.
  - When you owe the bank \$100m, that's the bank's problem.
- The bigger the check, the more *they* work for *you*
  - they don't want to lose the money invested
  - they don't want a bad result on their investment record
    - “an investment is an *endorsement* of that company as the winner in this space” — Secrets of Sand Hill Road
- VCs can connect you with customers, potential hires, potential new investors, etc.

# Raising Money

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Steps involved in pre-seed funding:

1. find a problem worth solving
2. build a minimum viable solution
3. find customers who love it
4. form a C corporation
5. prepare a pitch to describe your product / business vision
6. find investors who want to back you
7. agree on funding terms with a “SAFE”
  - 5 pages, just two numbers to agree on

# Pre-seed Pitch

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- Can be live or recorded
- Questions from potential investors:
  1. Can you **ship**?
    - need to finish building the product
  2. Can you **sell**?
    - need customers who want to buy the product
  3. Can you **hire**?
    - need more than a few people to build most products



# Pre-seed Pitch

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## 1. Can you **ship**?

- need to finish building the product
- We spent the whole quarter talking about this!
  - writing high quality code
  - tools, inspection, and testing
- Pitch includes a demo that shows what you can do
  - you've just seen one!
- You also need product ideas & design
  - must ship a product that people want

# Pre-seed Pitch

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## 2. Can you **sell**?

- need more customers who want to buy the product
  - what evidence do you have that they exist?
- Get feedback
    - talk to potential customers & investors
    - code must work (correctness)
  - Hard to get it right the first time
    - iterate! (changeability)
  - How will you find paying customers?
    - have a plan to use the money for this



# Pre-seed Pitch

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## 3. Can you **hire**?

- need more than a few people to build most products
- do you have a story to convince others to join
- You are asking employees to bet on the company also
  - need to sell to them just as much as investors
- You will need more programmers (& designers etc.)
  - must contribute quickly (understandability, modularity)
  - have a plan to use the money for this

# Preparing to Pitch

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- Expect to hear a lot of “no”s
  - angel investors may pass on 24 out of 25 pitches
  - successful companies have had 100 “no”s before a yes
  - thousands of angel investors... only takes one “yes”
- Hard to know what a particular VC is going to think
  - a16z: “we invest in good ideas that sounds like bad ideas”
  - may like the team but not the idea or vice versa
- Why back *this* team going after *this* idea?
  - what is your personal connection to the problem solved?

# More Help

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- UW [CoMotion](#)
  - startup training
  - connections and mentoring
  - office space (part of their startup incubator)
  - grants based on impact and financial need
- CSE 599: [Entrepreneurship](#) (offered winter quarter)
  - co-taught by Greg Gottesman from PSL
  - PSL is a local startup incubator
- VC in Founder's Hall (Pack Ventures)
  - angel investors in Gates & Allen

# Think About It

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- Never been easier to do a startup. Vs 40 years ago:
  - 100x more funding available
  - 100x less money required
- Startup / venture community
  - (naïvely) optimistic
  - supportive
  - VCs are happy to talk & help before you are ready to pitch
- Still many opportunities
  - one obvious area...
    - new business ideas any time expensive things become cheap
    - connectivity, wireless, parallel computing... now **AI**