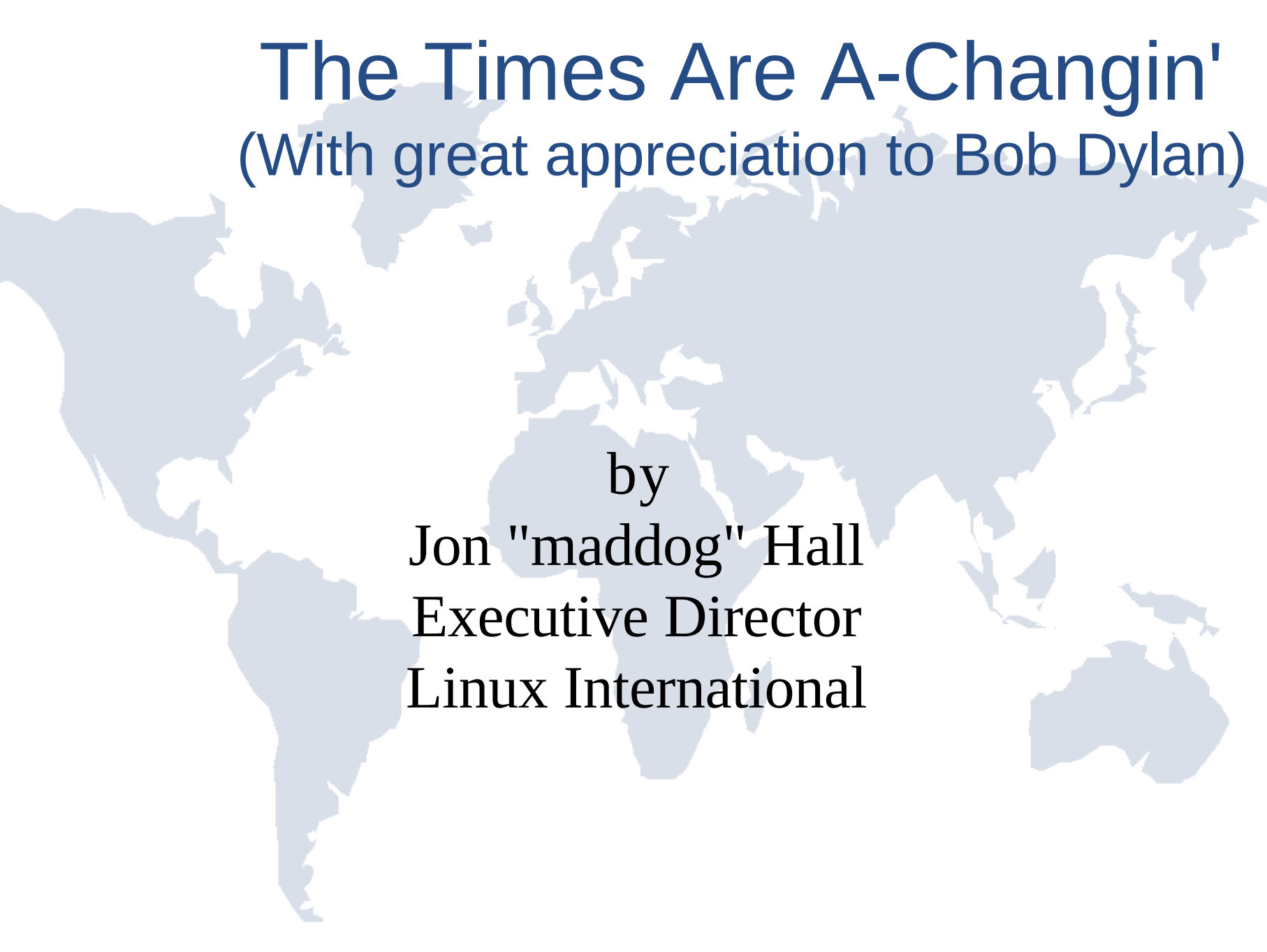


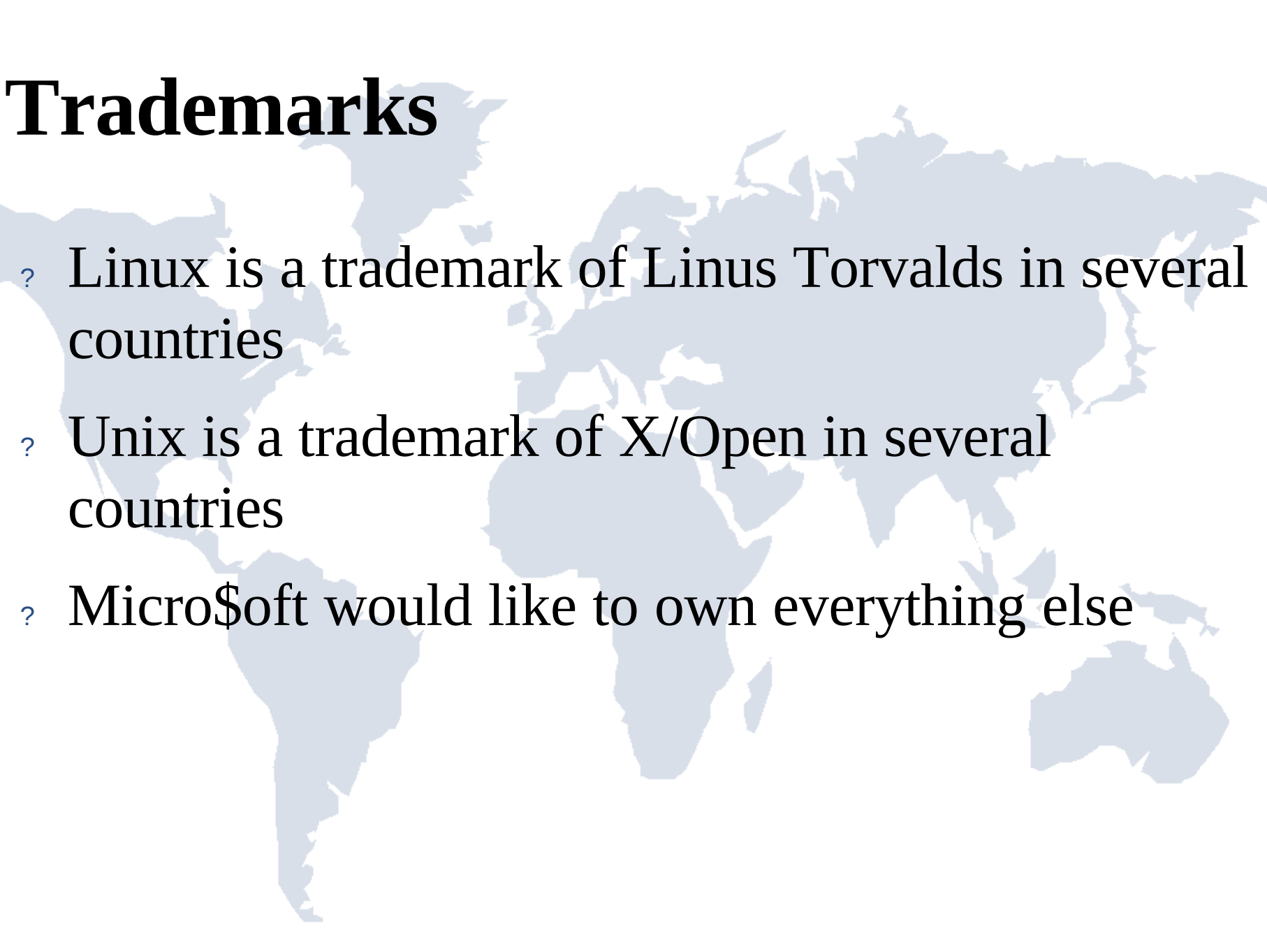


# The Times Are A-Changin'

(With great appreciation to Bob Dylan)

by  
Jon "maddog" Hall  
Executive Director  
Linux International

# Trademarks



- ? Linux is a trademark of Linus Torvalds in several countries
- ? Unix is a trademark of X/Open in several countries
- ? Micro\$oft would like to own everything else

# A Song of the 1960s

“The line it is drawn.  
The curse it is cast.  
...the first one now will later be last....  
....for the times they are a changin'.....”

- Bob Dylan

# Once Upon A Time: (1943-1977)

- ? Hardware was expensive, computers were few
  - Software was written by contract
  - Software was owned by end-user
- ? Operating systems optimized for:
  - Hardware
  - Job mix



# Middle Ground

? 1969

- DECUS
- Two births

? UNIX

- Hardware costs dropping
- Human costs rising

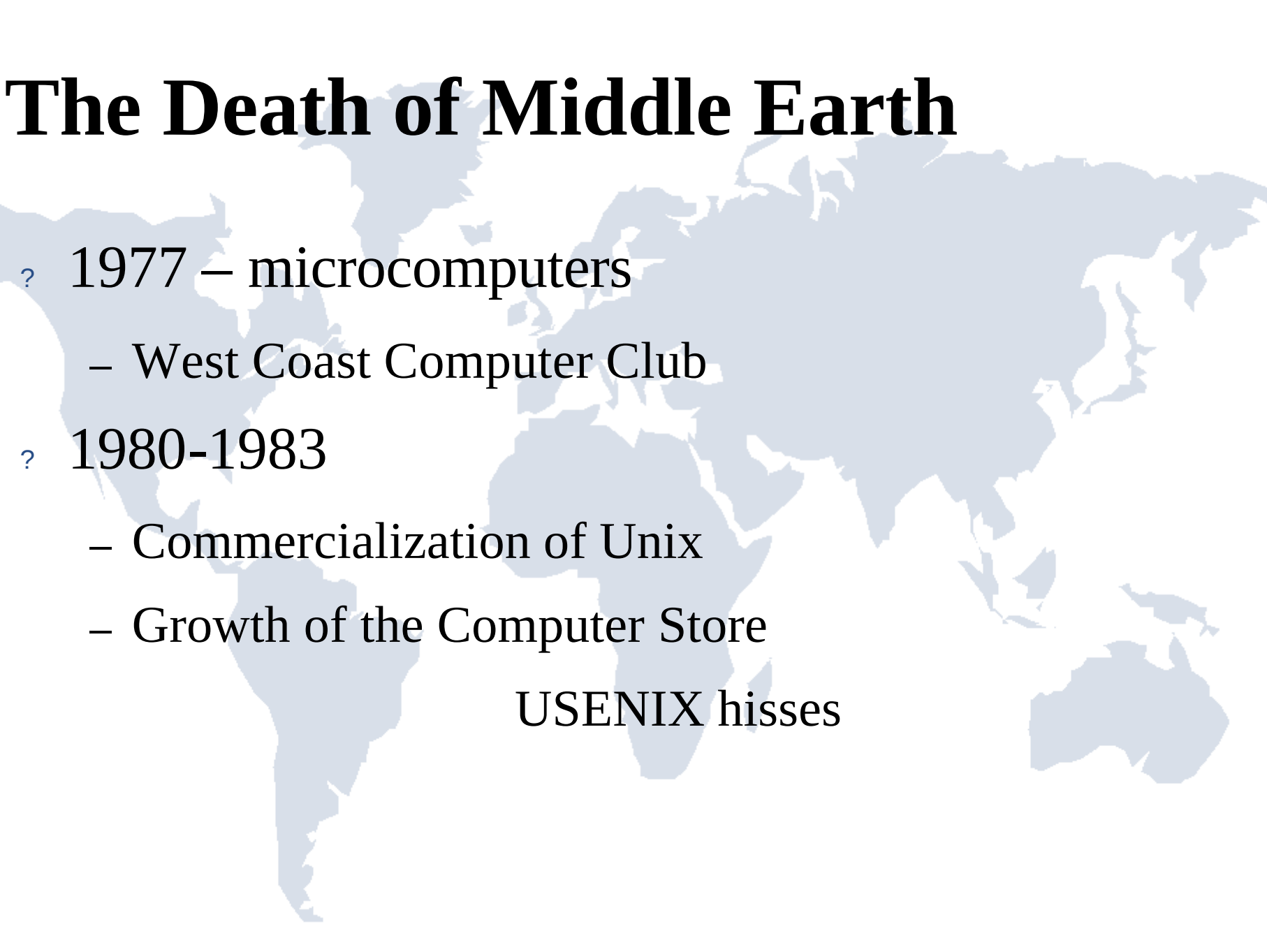
? A child

? The USENIX crowd cheered

- Academics used UNIX to do CS research



# The Death of Middle Earth



- ? 1977 – microcomputers
    - West Coast Computer Club
  - ? 1980-1983
    - Commercialization of Unix
    - Growth of the Computer Store
- USENIX hisses

# Another Important Event

1984-The GNU project started

# Software Li[vb]re!

? Free as in *freedom*, not free as in *beer*.

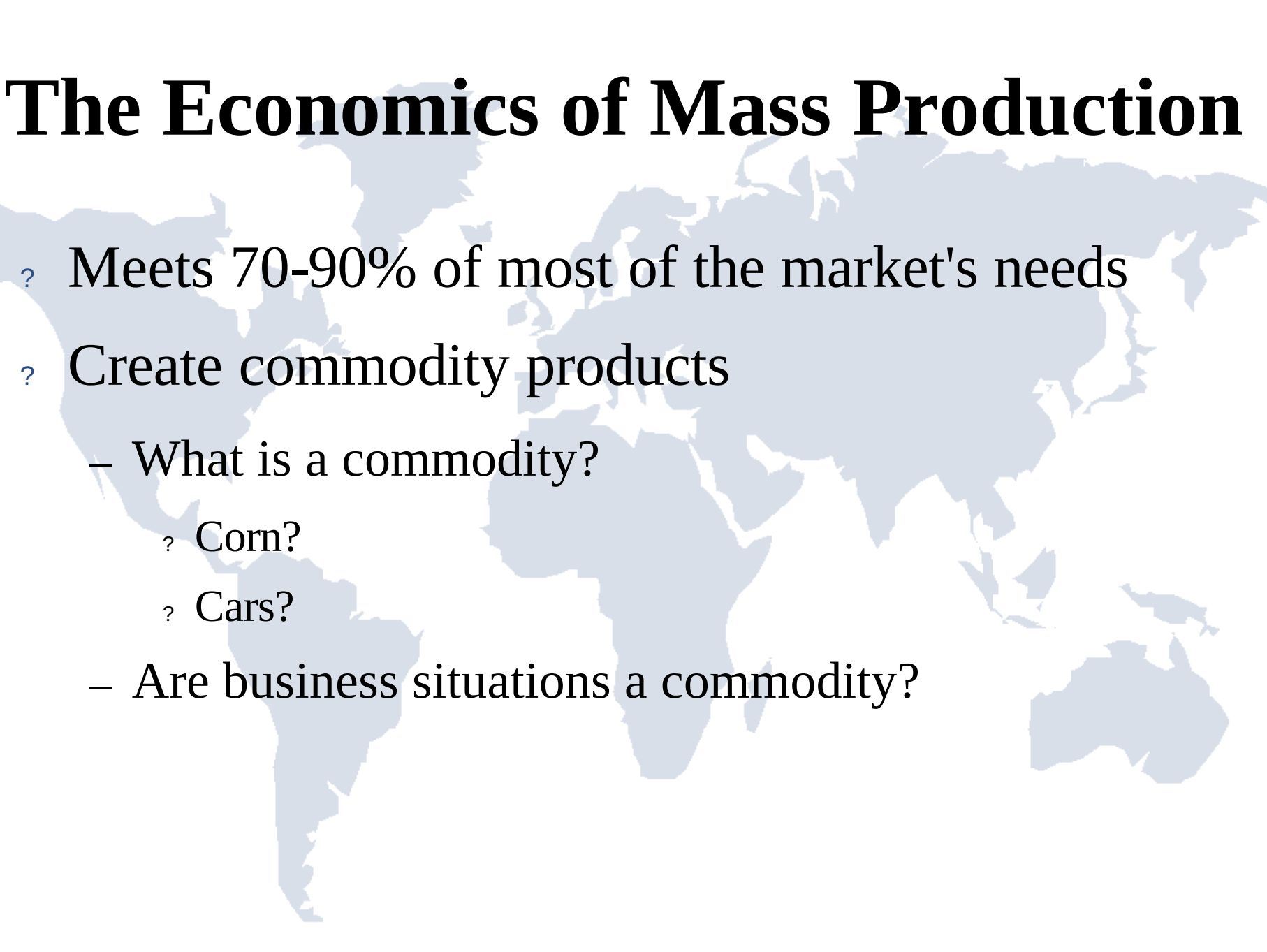
- Free to read the source code
- Free to make changes to the source code
- Free to redistribute those changes

? GPL vs BSD

- You can not limit another's freedoms

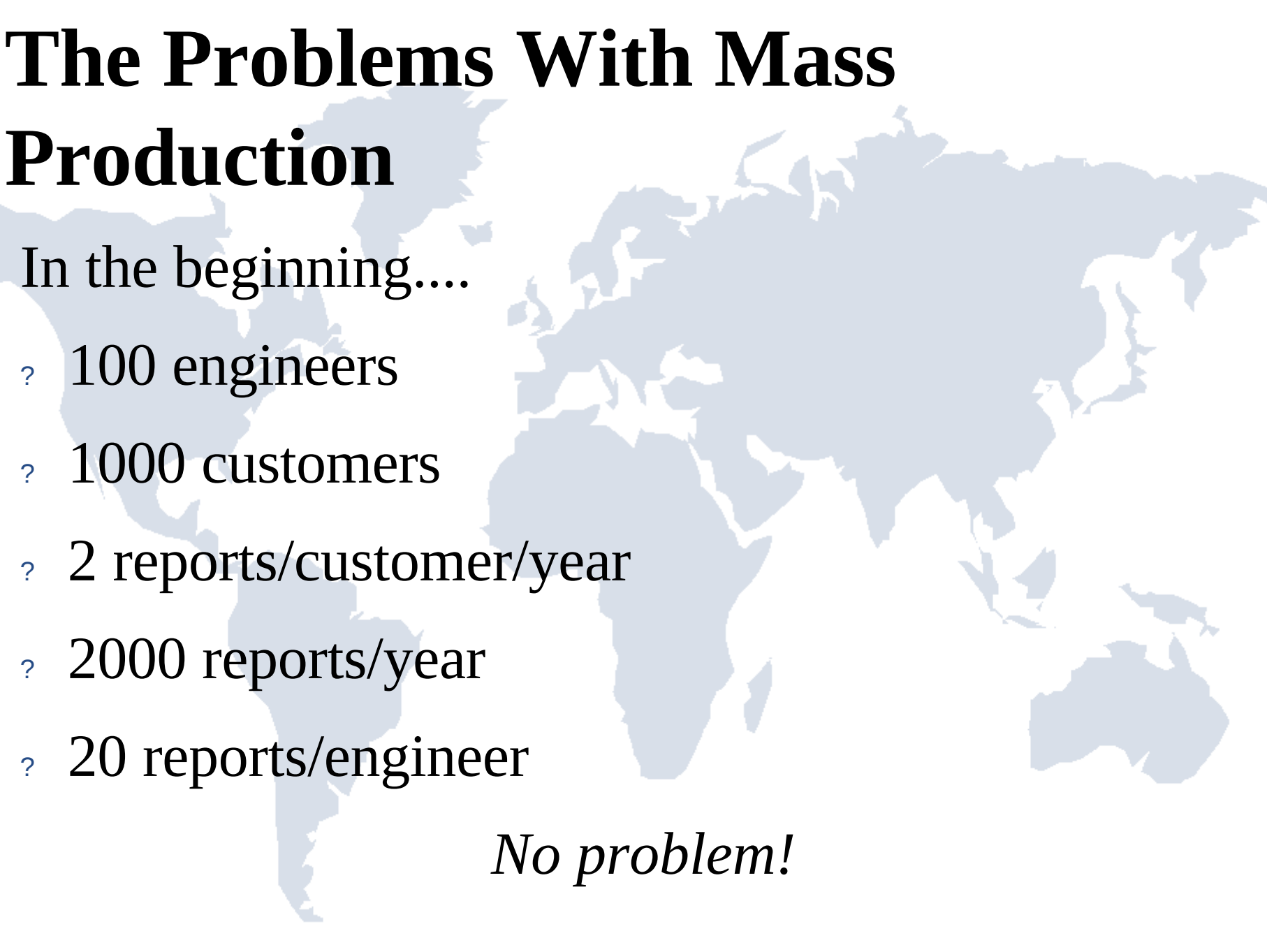
Richard Stallman has *never* said you should not make money writing software.

# The Economics of Mass Production



- ? Meets 70-90% of most of the market's needs
- ? Create commodity products
  - What is a commodity?
    - ? Corn?
    - ? Cars?
  - Are business situations a commodity?

# The Problems With Mass Production



In the beginning....

- ? 100 engineers
- ? 1000 customers
- ? 2 reports/customer/year
- ? 2000 reports/year
- ? 20 reports/engineer

*No problem!*

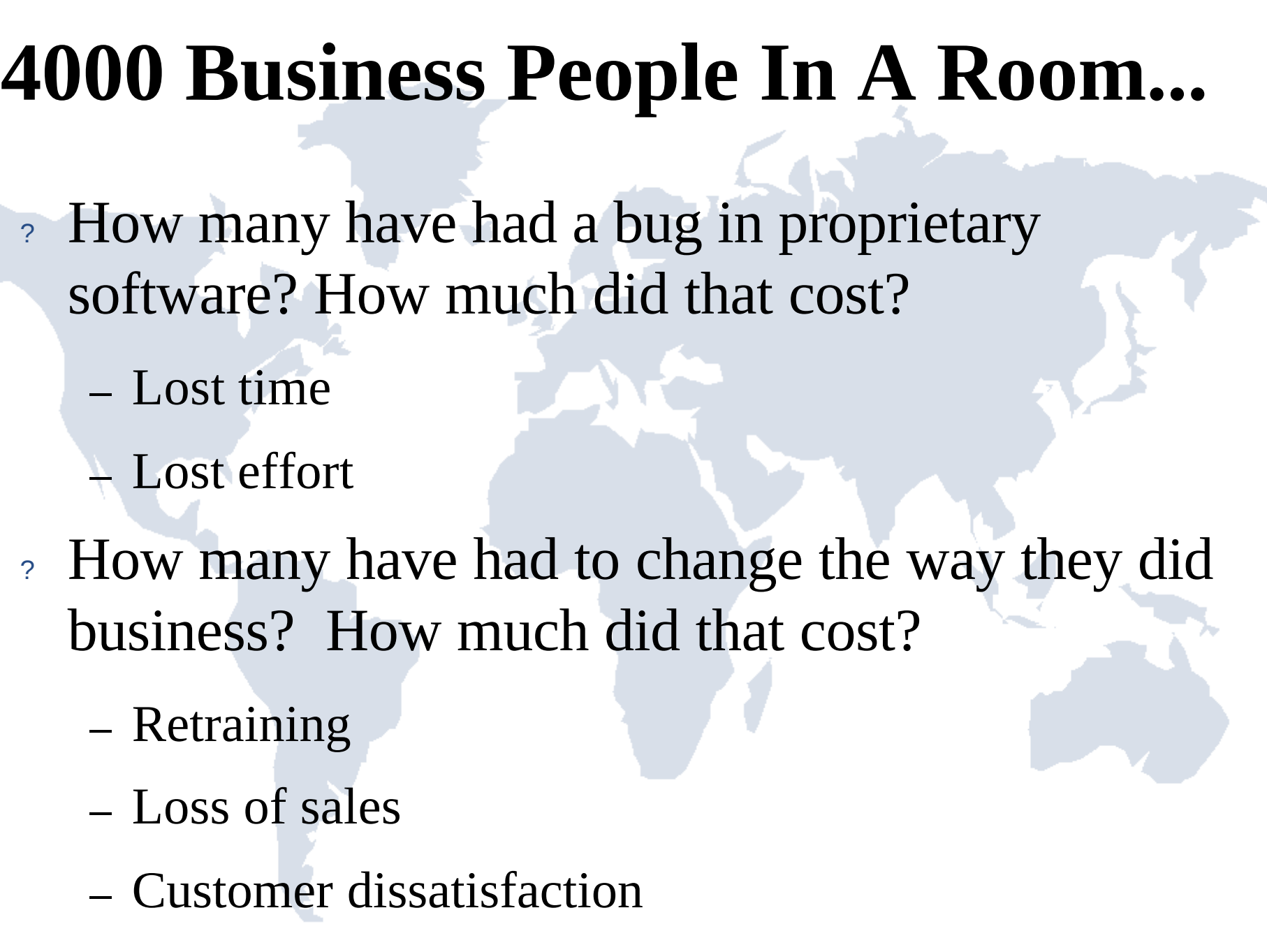
# Now It Is 2003...

Our company has grown

- ? 200 engineers
- ? 4.5 million customers
- ? 2 reports/customer/year...

Do you see the problem?

# 4000 Business People In A Room...

- 
- ? How many have had a bug in proprietary software? How much did that cost?
    - Lost time
    - Lost effort
  - ? How many have had to change the way they did business? How much did that cost?
    - Retraining
    - Loss of sales
    - Customer dissatisfaction

# Why Will Closed Source Software Fail?

How much does it cost us when our software

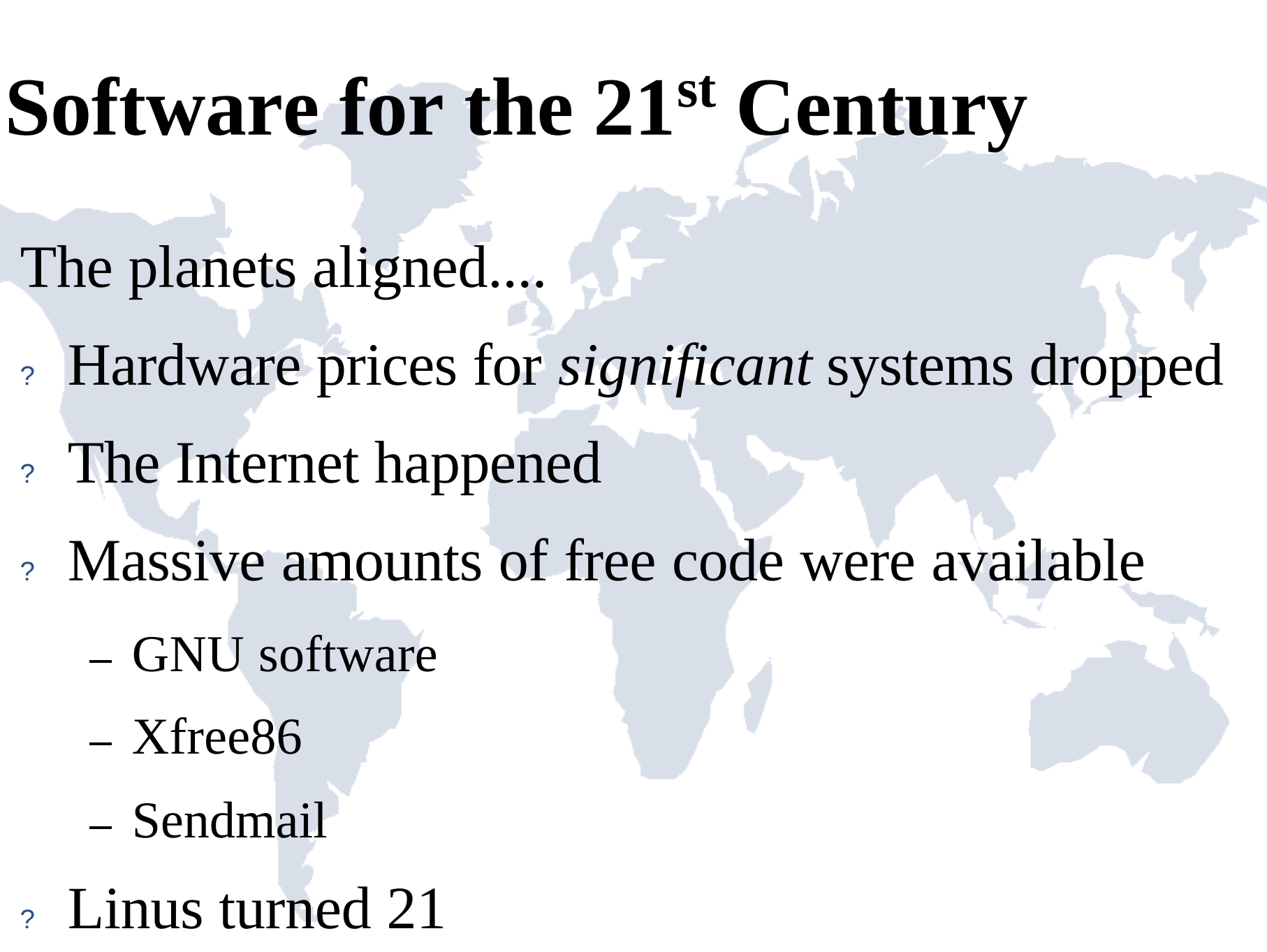
- ? Does not do what we want it to?
- ? Does not work at all?
  - Read the EULA
- ? Does it cost \$10/system? \$100/system?

There are 500,000,000 general-purpose computers



There are 6 *Billion* people

# Software for the 21<sup>st</sup> Century



The planets aligned....

- ? Hardware prices for *significant* systems dropped
- ? The Internet happened
- ? Massive amounts of free code were available
  - GNU software
  - Xfree86
  - Sendmail
- ? Linus turned 21

# ***A New Old Model of Developing Software***

When software is free....

- ? You pay for service
  - Service in copying and distributing
  - Service in getting features in your timeframe
  - Service in integrating
  - Service in training
- ? Best Case: You never pay for the software again
- ? Worst Case: You pay for the software one time

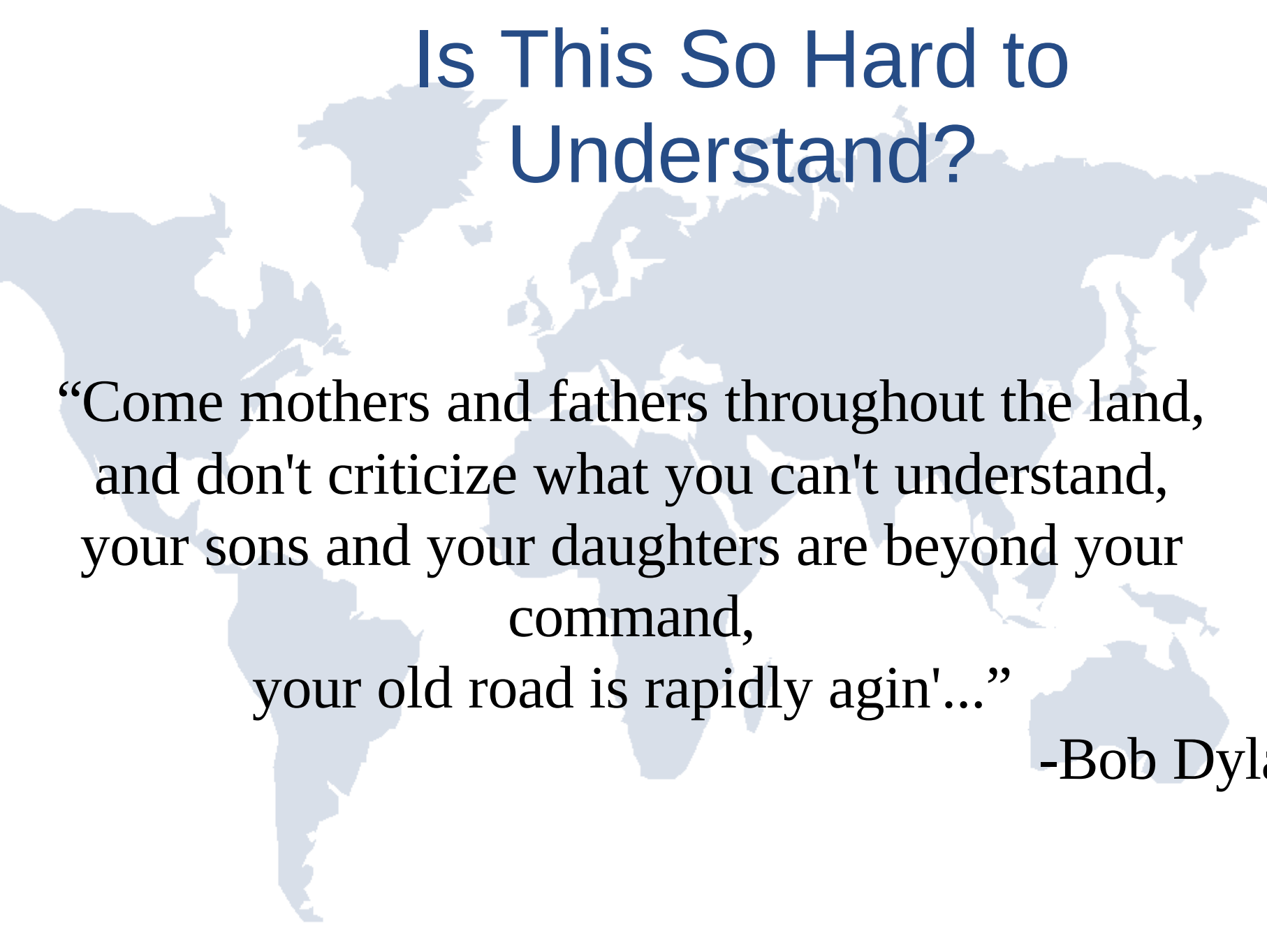
# A New Model of Funding Software

- ? 500,000,000 people use software
- ? 250,000,000 want to change it
- ? 125,000,000 have the time to change it
- ? 65,000,000 have the expertise to change it
- ? 33,000,000 actually do some work on it

What happens when China is fully on board? Russia?

# **[www.sourceforge.net](http://www.sourceforge.net)**

- ? 60,000+ projects
- ? 600,000+ registered developers

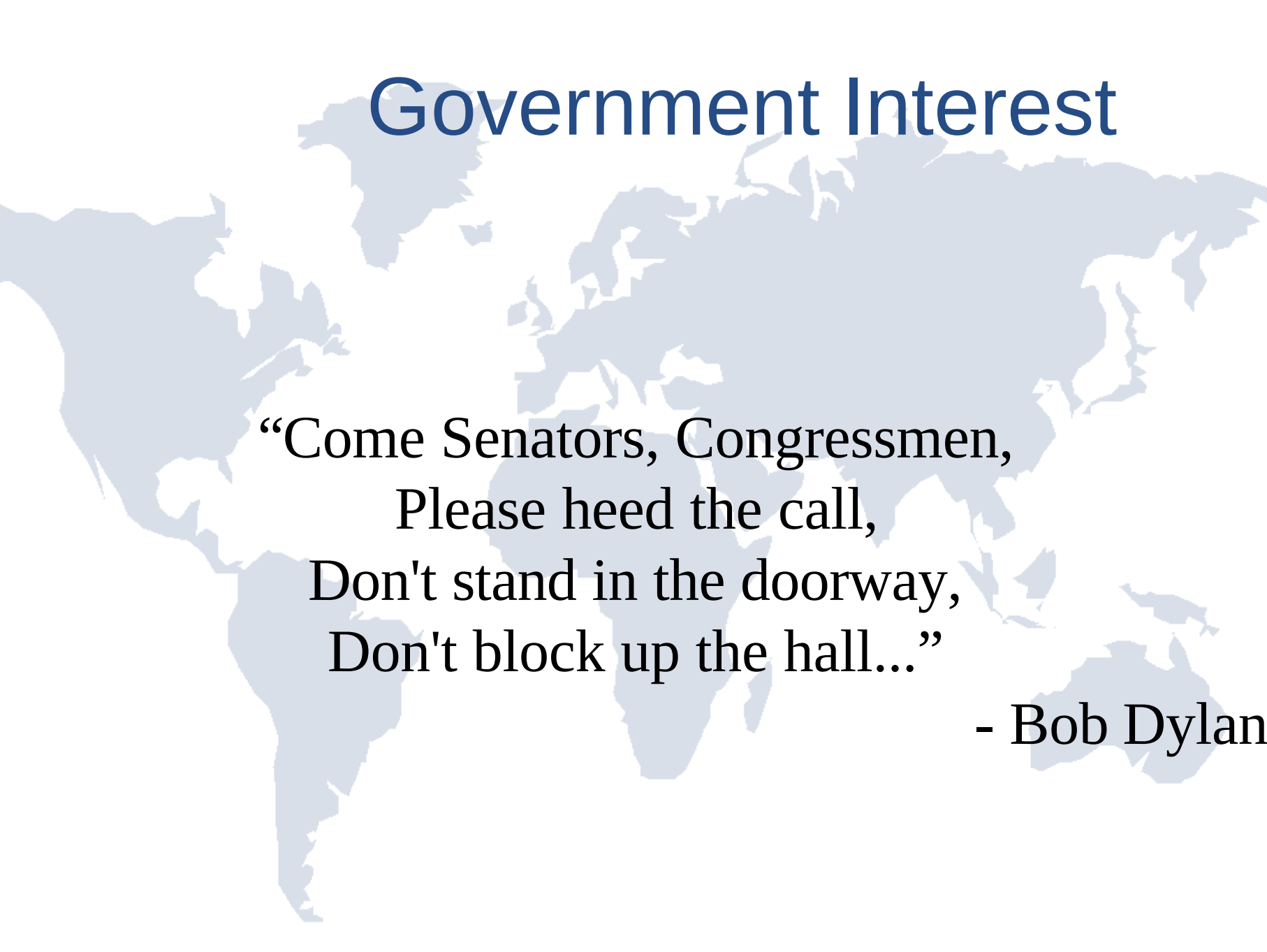


# Is This So Hard to Understand?

“Come mothers and fathers throughout the land,  
and don't criticize what you can't understand,  
your sons and your daughters are beyond your  
command,  
your old road is rapidly agin'...”

-Bob Dylan

# Government Interest



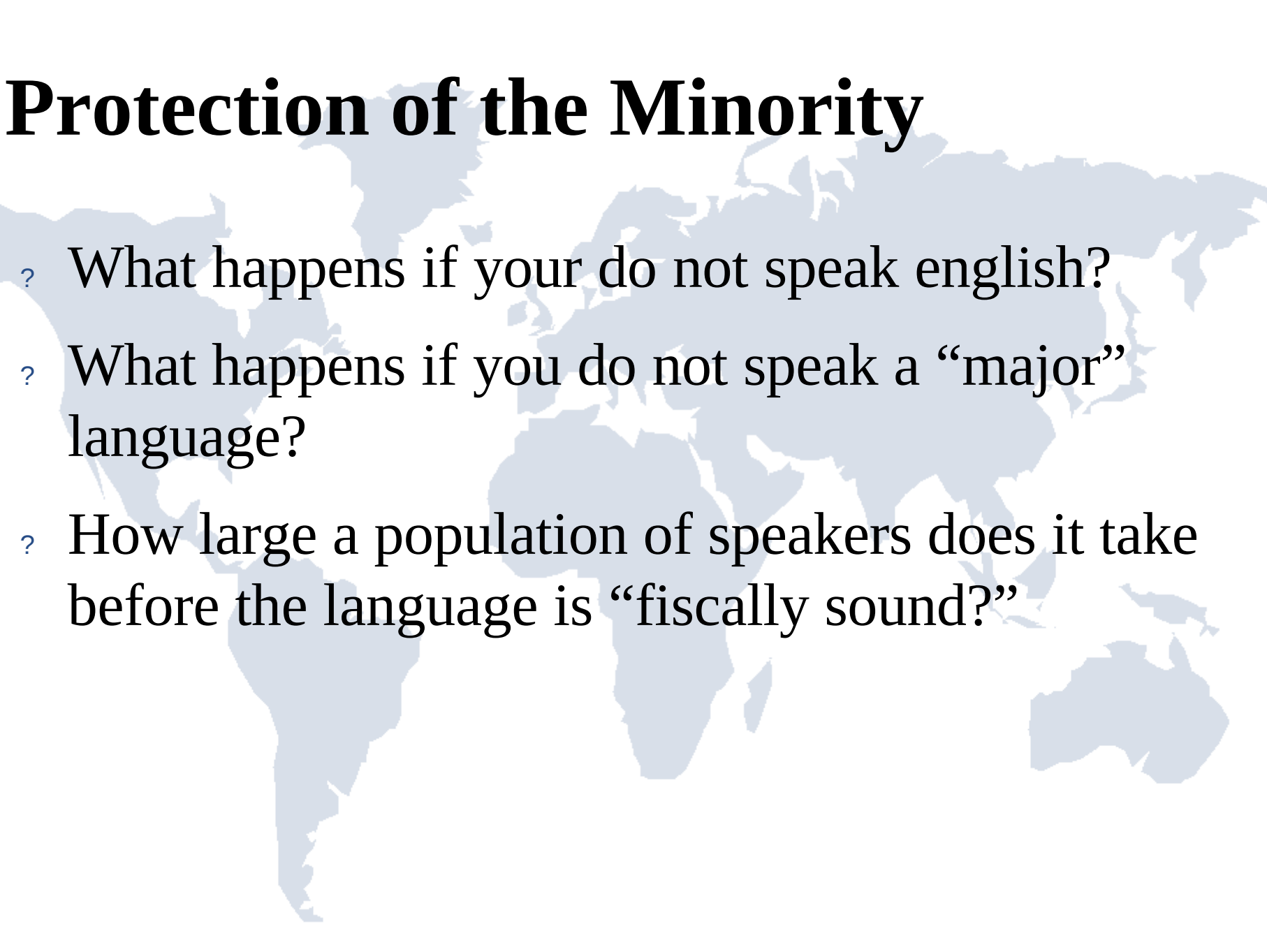
“Come Senators, Congressmen,  
Please heed the call,  
Don't stand in the doorway,  
Don't block up the hall...”

- Bob Dylan

# Why Government Interest In Software Li[ve]re?

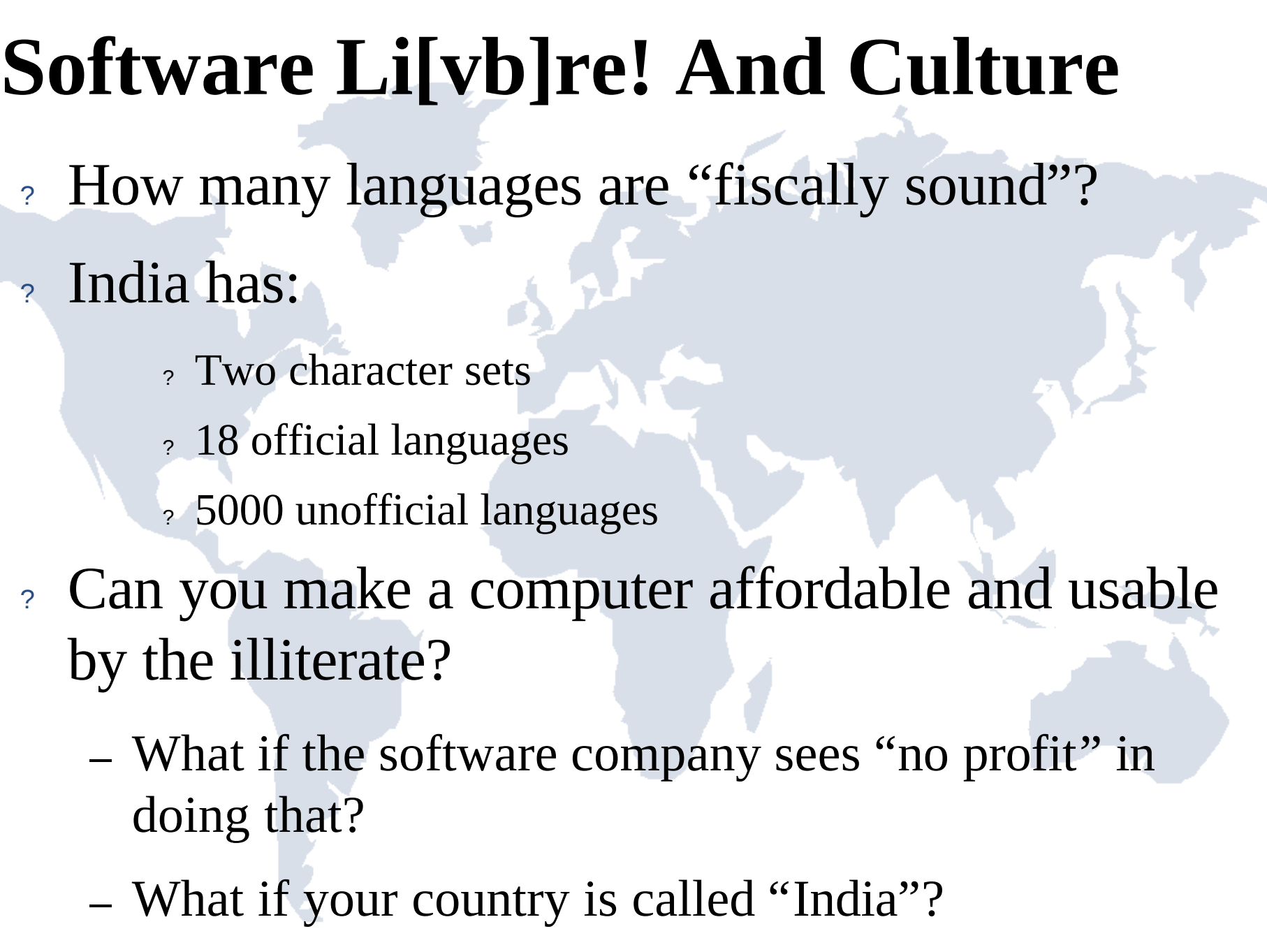
- ? Security is more than keeping secrets safe
- ? Security is also longevity of the project
  - Will you need email in time of war?
  - Will you need to fix bugs in the operating system guiding your ships and planes?
  - What happens when the company that supplies your email
    - ? Goes out of business?
    - ? Stops the product line?

# Protection of the Minority



- ? What happens if you do not speak english?
- ? What happens if you do not speak a “major” language?
- ? How large a population of speakers does it take before the language is “fiscally sound?”

# Software Li[vb]re! And Culture

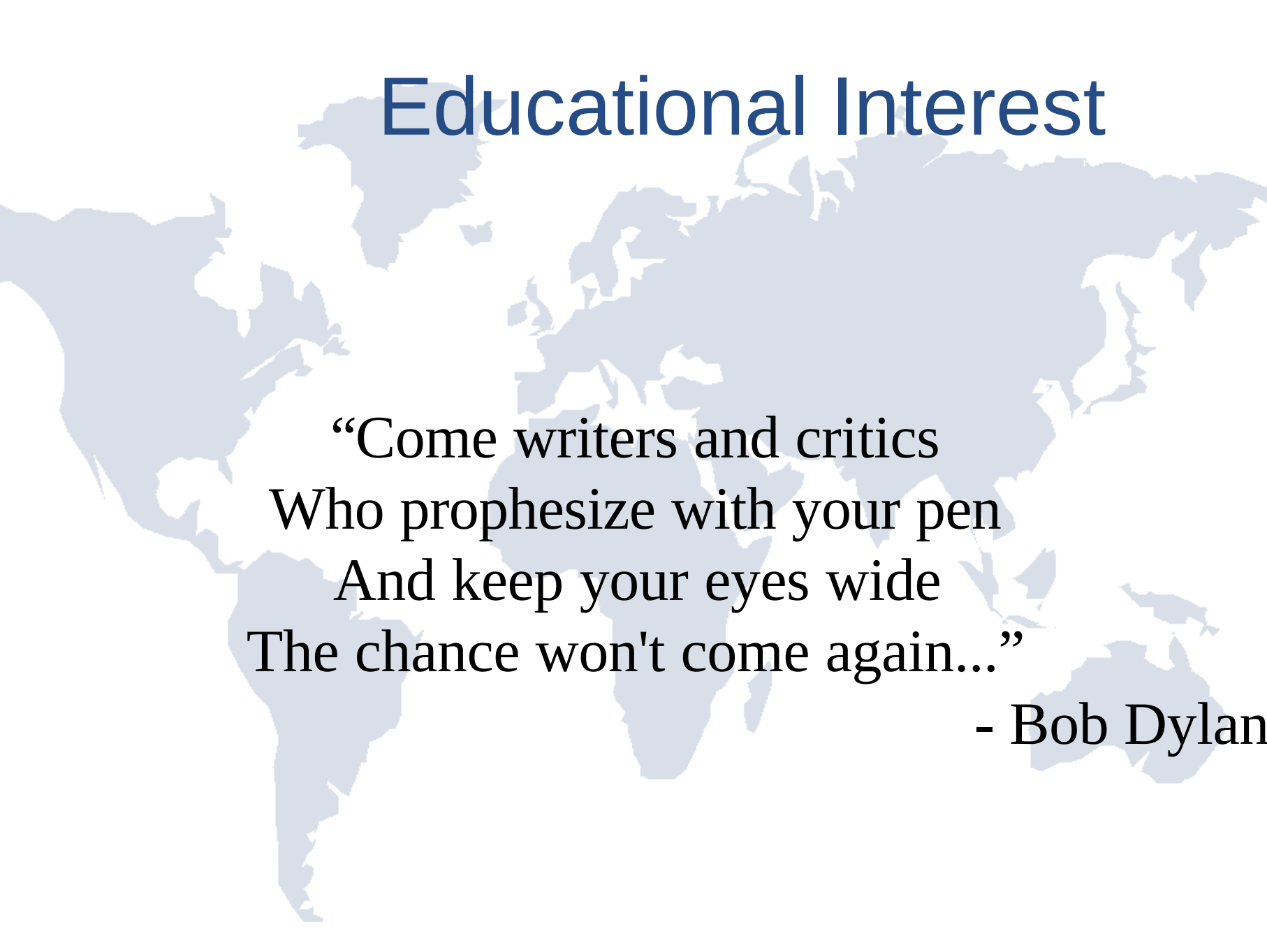
- 
- ? How many languages are “fiscally sound”?
  - ? India has:
    - ? Two character sets
    - ? 18 official languages
    - ? 5000 unofficial languages
  - ? Can you make a computer affordable and usable by the illiterate?
    - What if the software company sees “no profit” in doing that?
    - What if your country is called “India”?

# A Balance of Payments

Software Freedom means...

- ? Less money leaves your country for packaged software
- ? More money can be spent **locally** on tailoring Open Source, which..
  - Creates **local** jobs
    - ? Who eat **local** food, buy **local** housing, pay **local** taxes
      - Which creates more **local** businesses
        - ? Who need more tailoring of software
          - ? Which creates more **local** jobs

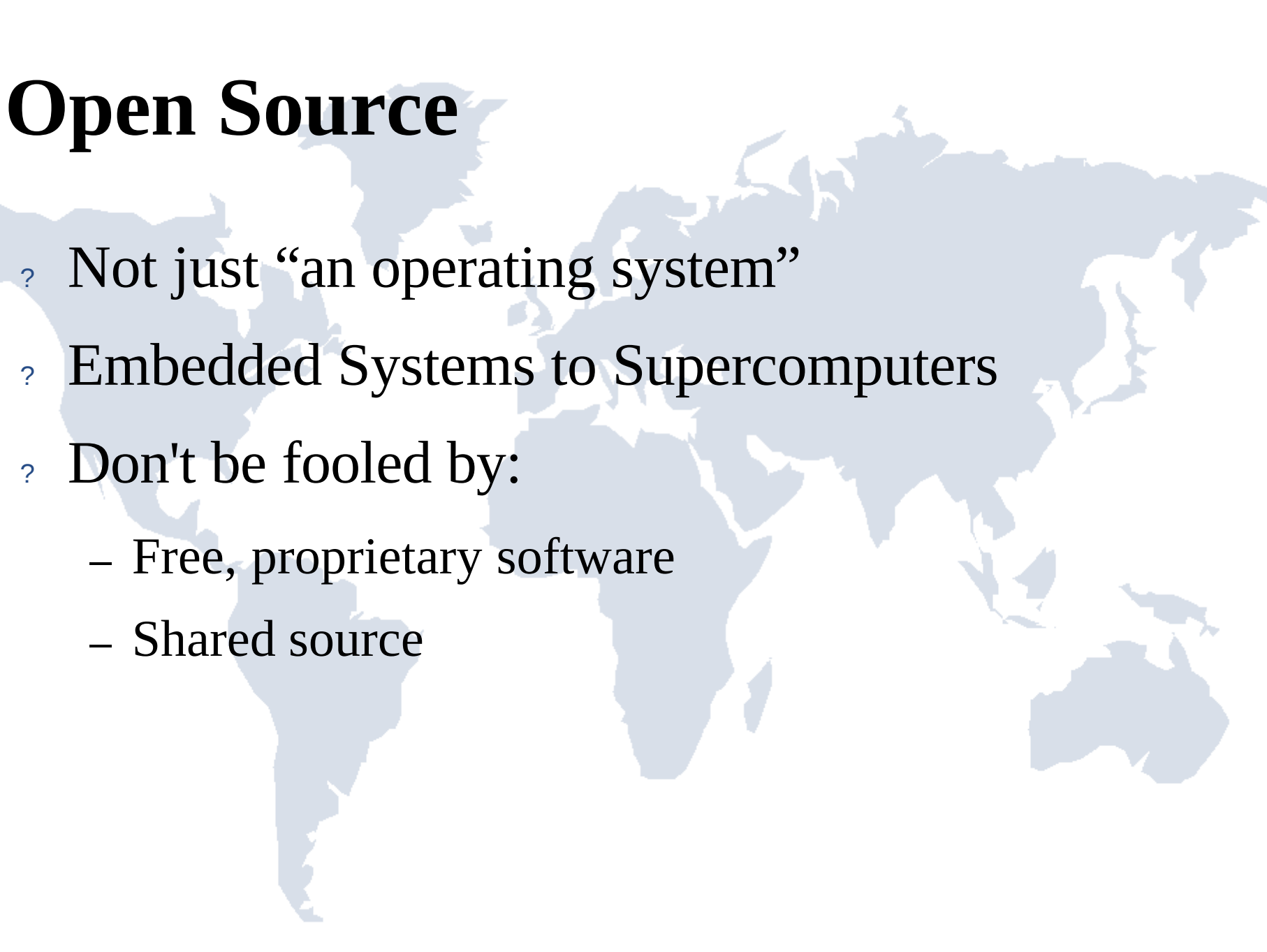
# Educational Interest



“Come writers and critics  
Who prophesize with your pen  
And keep your eyes wide  
The chance won't come again...”

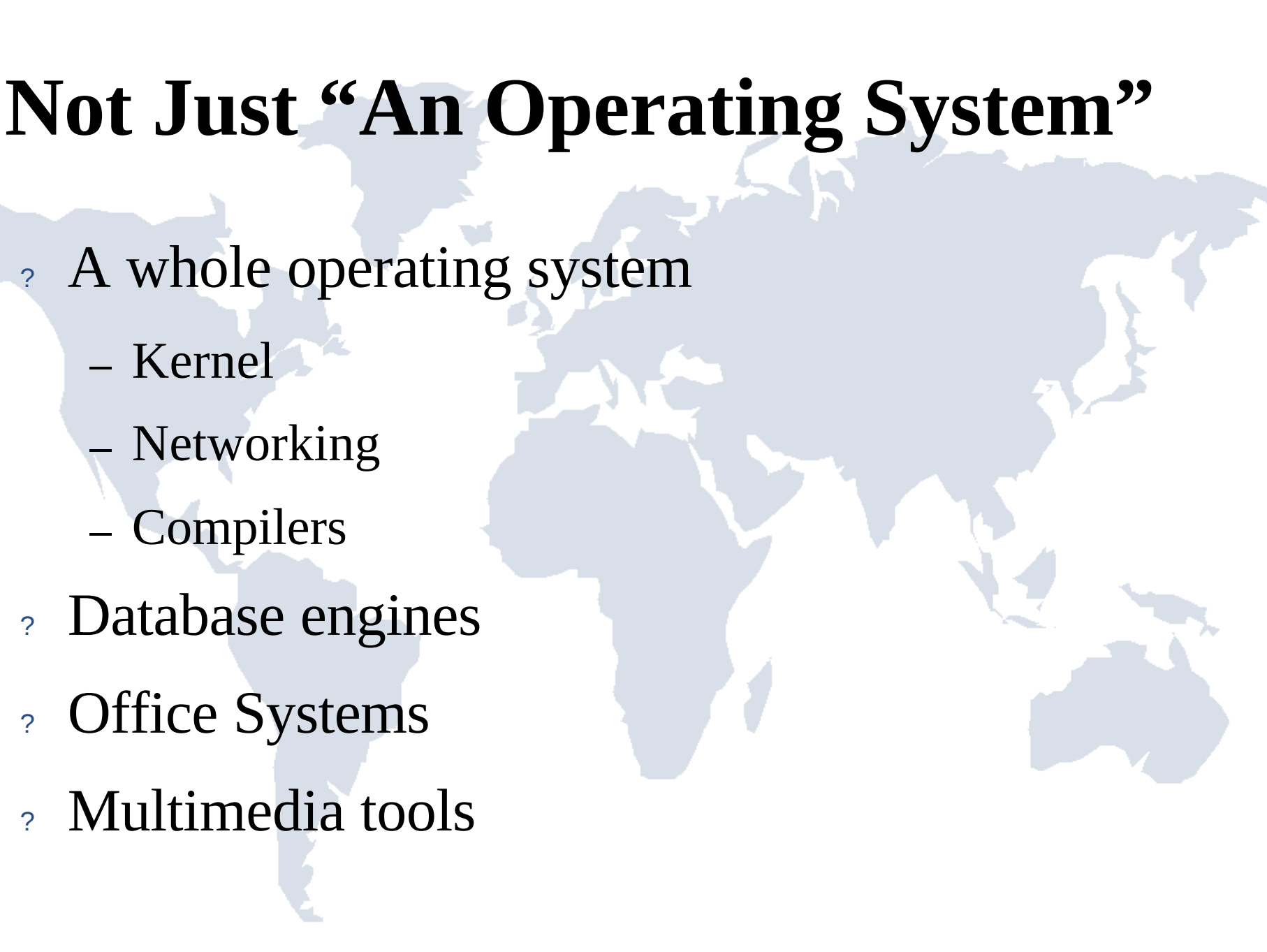
- Bob Dylan

# Open Source



- ? Not just “an operating system”
- ? Embedded Systems to Supercomputers
- ? Don't be fooled by:
  - Free, proprietary software
  - Shared source

# Not Just “An Operating System”



- ? A whole operating system

- Kernel
- Networking
- Compilers

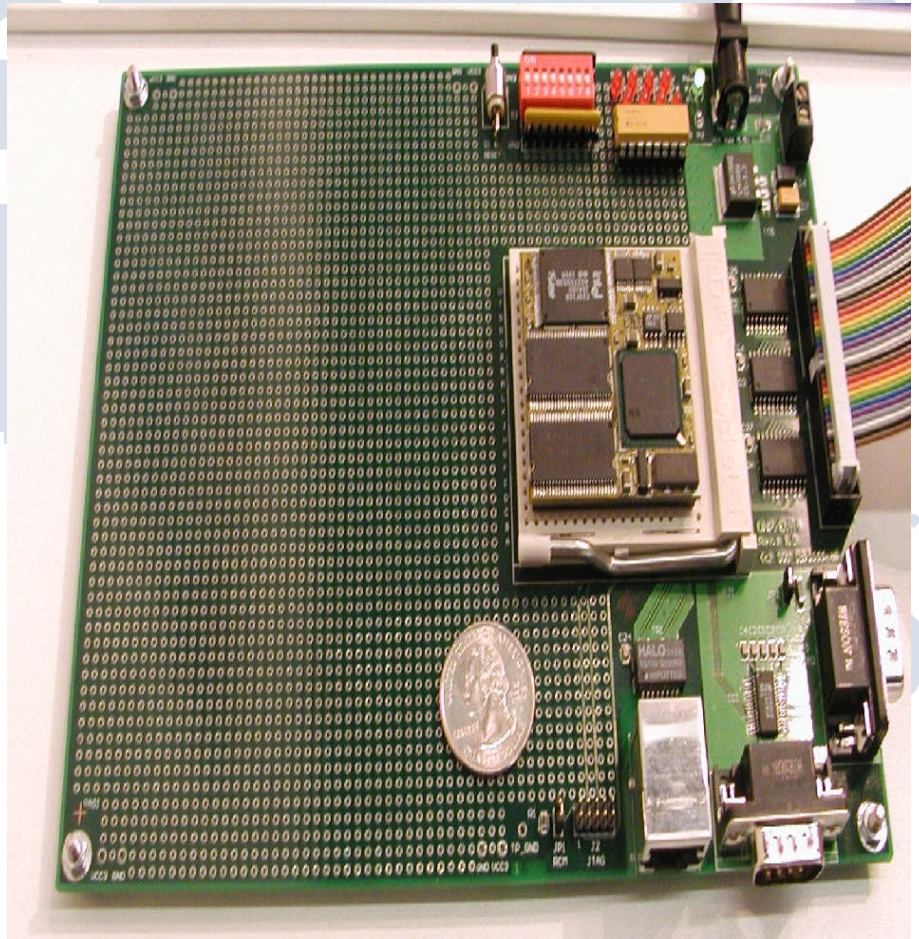
- ? Database engines

- ? Office Systems

- ? Multimedia tools

# Embedded Systems....

- ? Modular kernel
- ? Multi
  - Architecture
  - Tasking
- ? Royalty Free



# ....to Supercomputers

- ? Beowulf Systems
- ? Numa machines
  - The same APIs

“The power of an IBM SP/2 for  
1/40<sup>th</sup> of the price.”

- Pat Goda, Los Alamos Labs

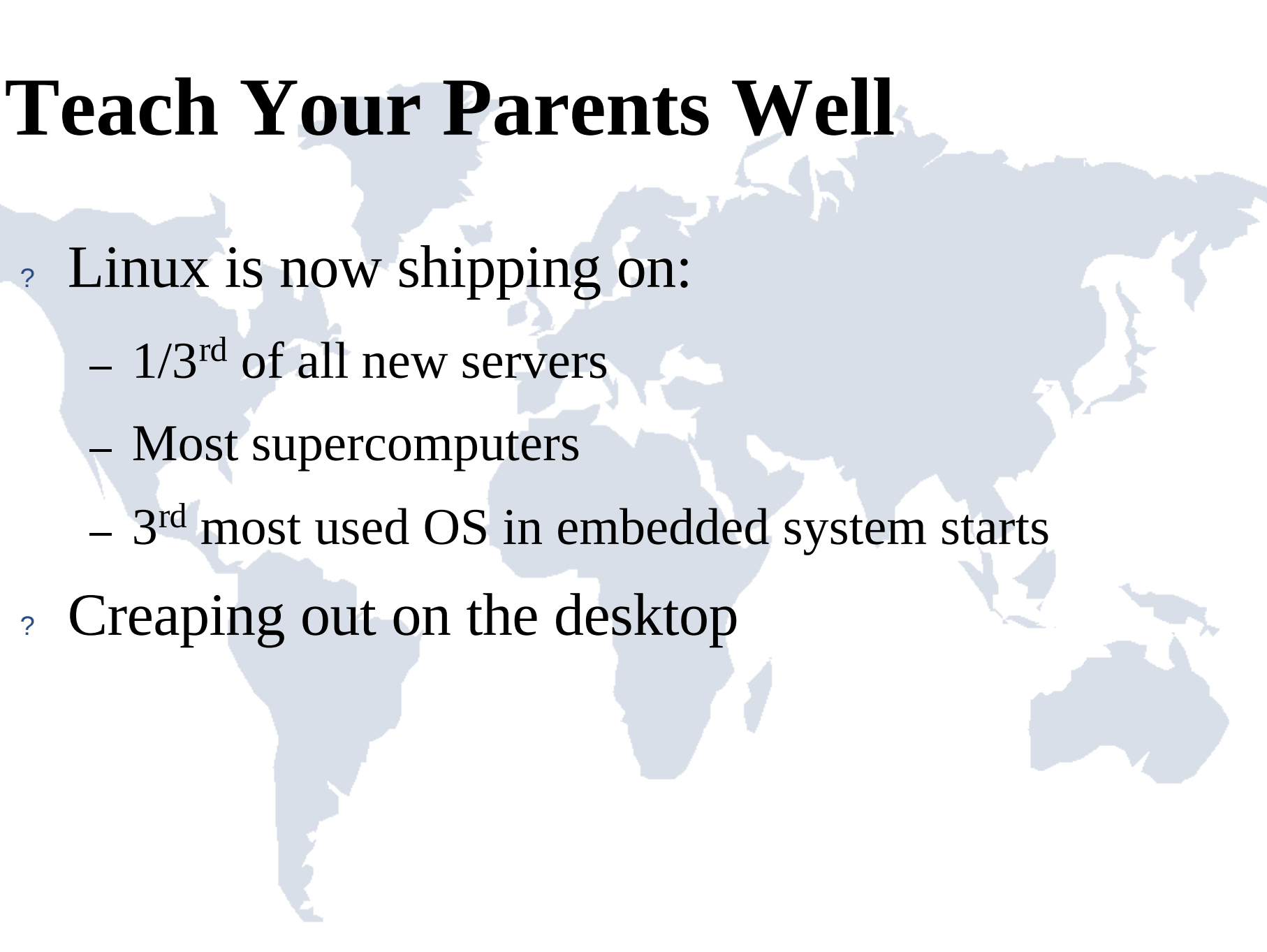


# The Near Future: Carrier Grade Linux

## Open Source Development Labs

- ? Many sponsors
- ? Test Labs
- ? Sponsor projects

# Teach Your Parents Well



- ? Linux is now shipping on:
  - 1/3<sup>rd</sup> of all new servers
  - Most supercomputers
  - 3<sup>rd</sup> most used OS in embedded system starts
- ? Creaping out on the desktop

# I Would Like to Thank



- ? Linux International member companies
- ? [www.veniceplaza.net](http://www.veniceplaza.net) for arranging this series of talks
- ? But most importantly....

# I Would Like to Thank The Linux Community on behalf of:

- ? The Borehole Project in Africa (allows clean water for 7000 additional families)
- ? Creation of low-cost community computers for India bringing Internet capabilities (\$200 for a sharable computer)
- ? The Royal Navy Air and Rescue Force (allows faster rescues)
- ? The Genome project (allows easier sharing of data)
- ? Faster Detection of Cancer (24 hours to 10 minutes)
- ? For the hundreds of students at the University of the South Pacific in Fiji (to study and learn)
- ? 1600 doctors in Cuba who use it (to spread information)
- ? Scientists at Fermilab looking for the smallest bit