

Y2K: THE BUG THAT DIDN'T BITE

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2000







NOKIA

1 2 3
4 5 6
7 8 9
* 0 #

NIRVANA

TLC

90's

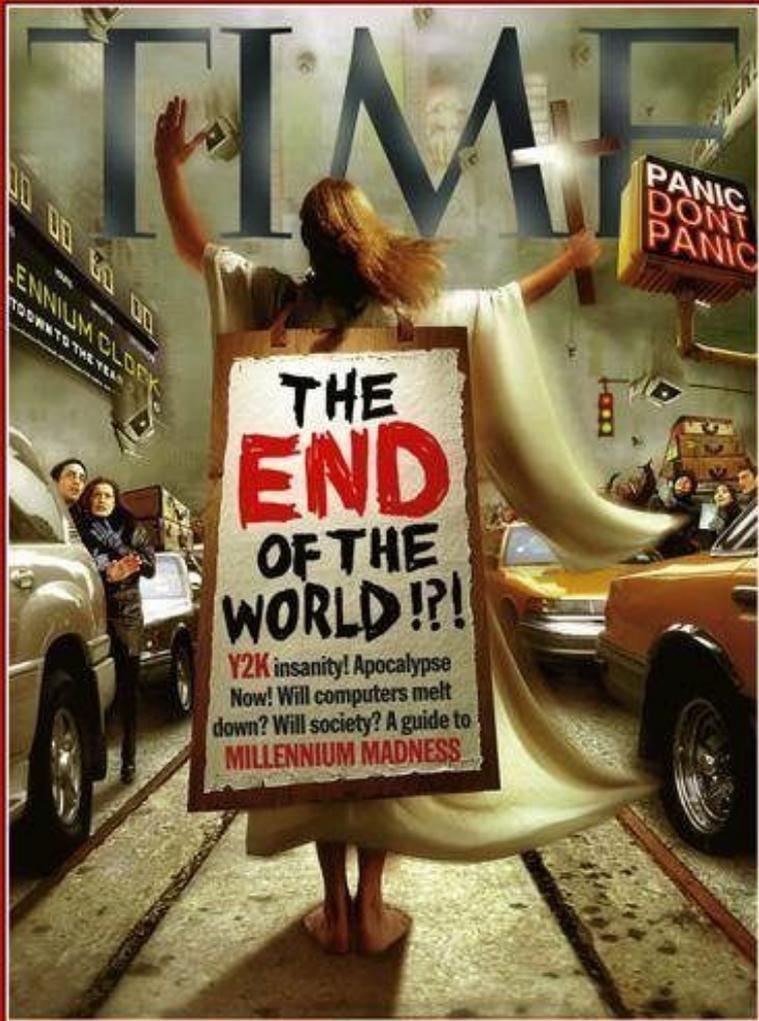
219

4









NEWS

THE COMPUTER CRASH OF THE MILLENNIUM!

September 15, 1998 \$1.39 U.S. \$1.59 CANADA/70p U.K.

JANUARY 1, 2000

THE DAY THE EARTH WILL STAND STILL!

ALL BANKS WILL FAIL!

FOOD SUPPLIES WILL BE DEPLETED!

ELECTRICITY WILL BE CUT OFF!

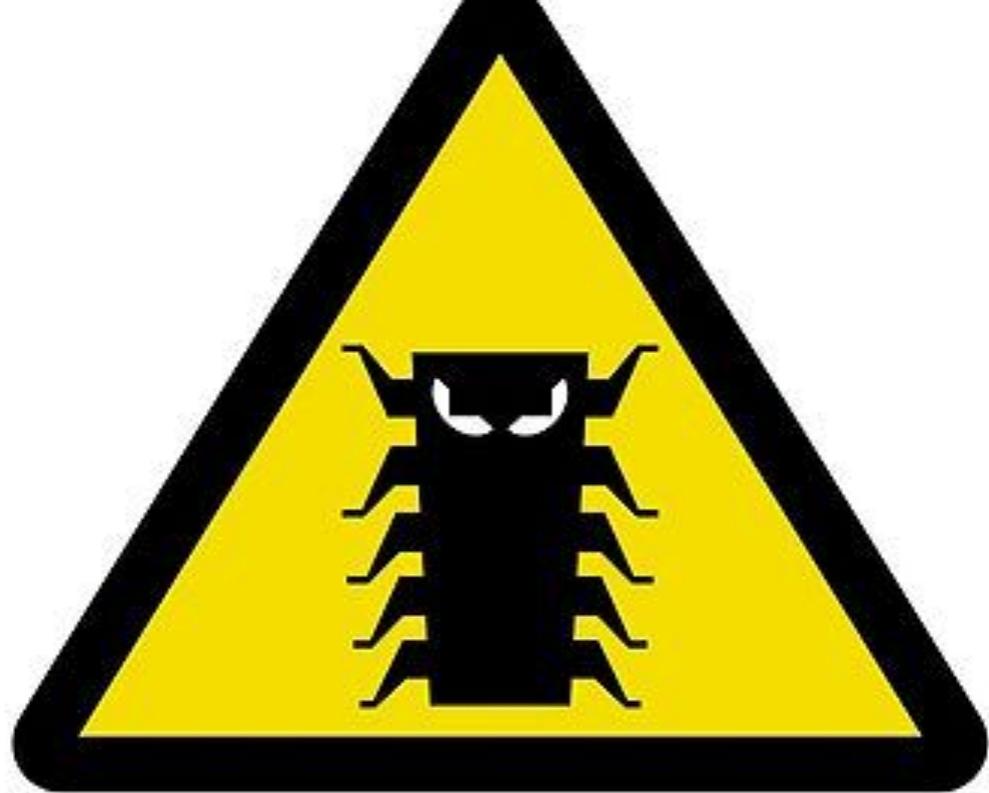
THE STOCK MARKET WILL CRASH!

VEHICLES USING COMPUTER CHIPS WILL STOP DEAD!

TELEPHONES WILL CEASE TO FUNCTION!

DOMINO EFFECT WILL CAUSE A WORLDWIDE DEPRESSION!





**Millennium bug
act now!**



97

98

99

00

The Two-Digit Year Problem

20th June 1982



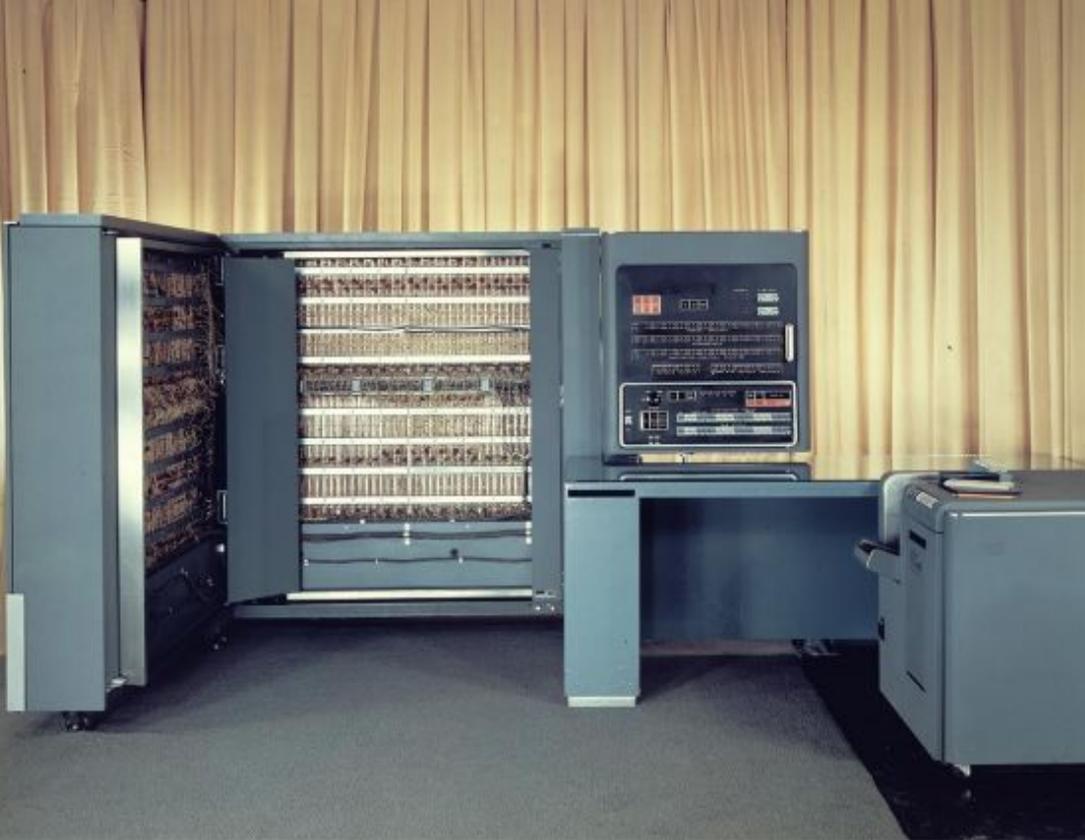
20/06/82

```
// date_now = 20/06/82
```

```
CENTURY_YEAR = 1900
```

```
last_two_digits_of_year = yearPart(date_now) // 82
```

```
full_year = CENTURY_YEAR + year // 1982
```

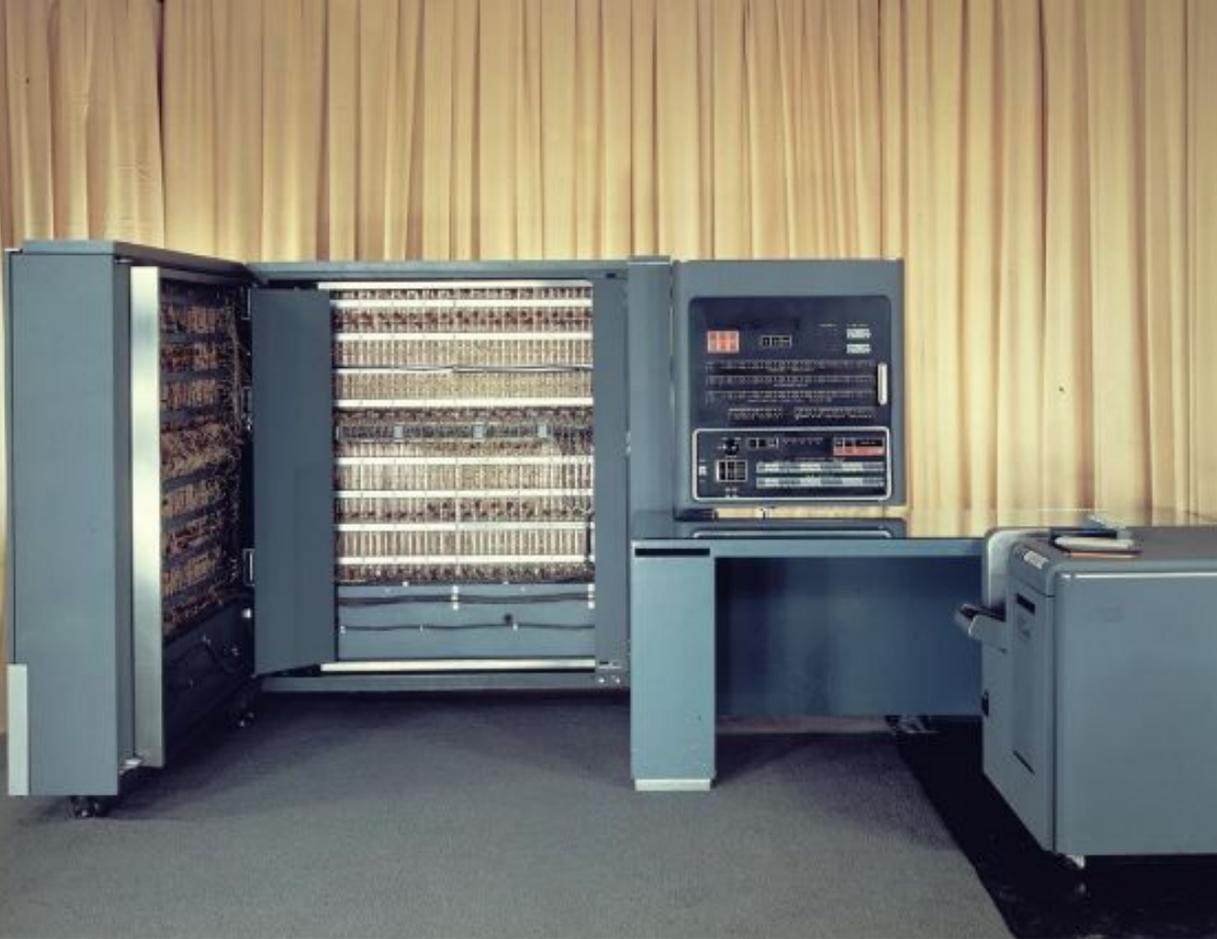


ai

IBM 1401 - **16kB** of memory



iPhone - **256GB**



x 16,000,000



Overflow

0
1
2
3
4
5
6
7
8
9

ten's column



1	0
1	1
1	2
1	3
1	4
1	5
1	6
1	7
1	8
1	9

hundred's column



1

0
0
0
9
9
9
9
9
9
9

0
1
2
3
4
5
6
7
8
9

hundred's column



1

0

0

0

1

0

2

9

3

9

4

9

5

9

6

9

7

9

8

9

9

```
// current_date = 28/12/99  
// date_of_last_test = 24/12/99
```

```
days_since_last_test = current_date - date_of_last_test; // 4 days
```

```
if (days_since_last_test > 3) {  
    runTest();  
    date_of_last_test = current_date;  
}
```

```
// current_date = 28/12/99  
// date_of_last_test = 28/12/99
```

```
days_since_last_test = current_date - date_of_last_test; // 0 days
```

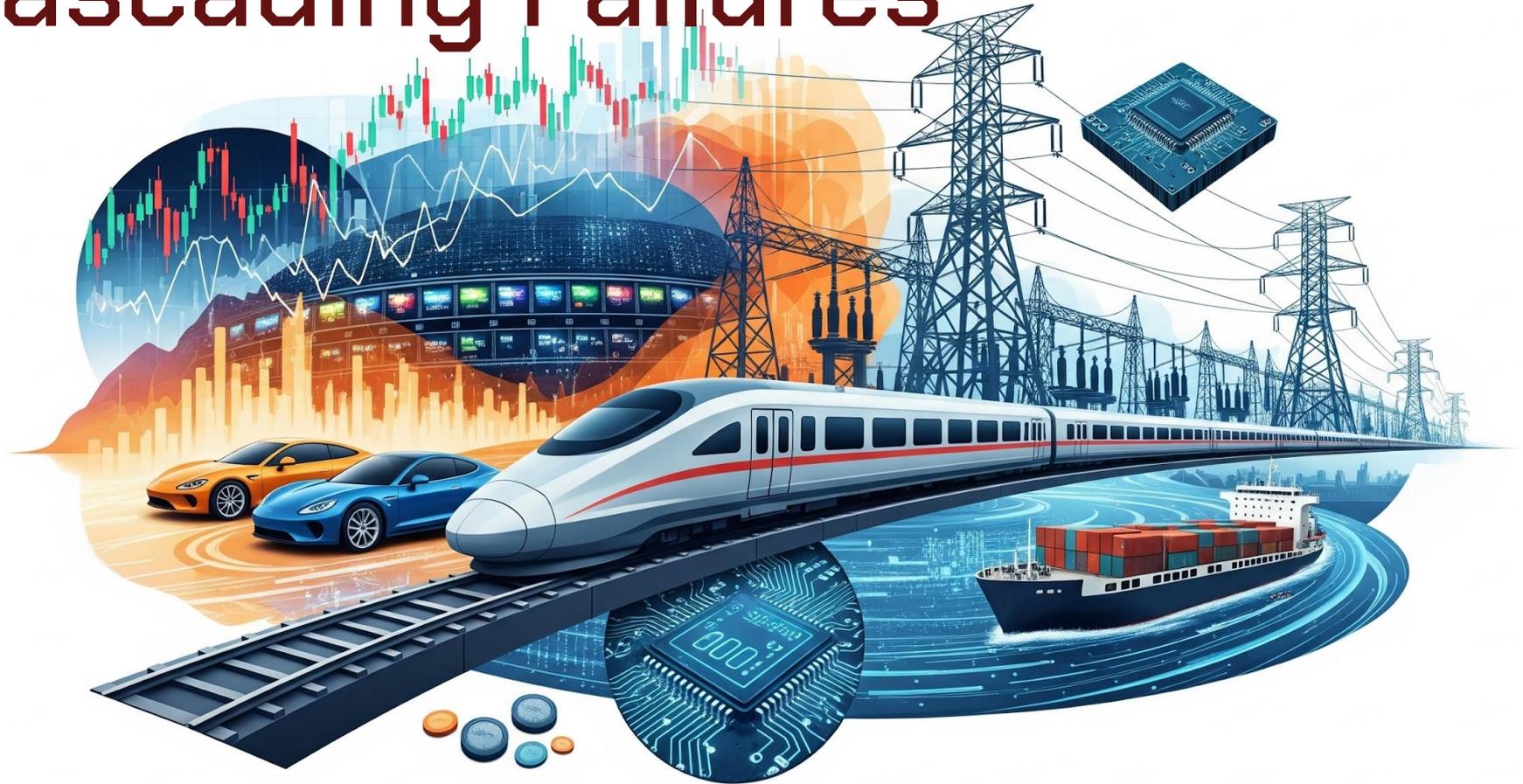
```
if (days_since_last_test > 3) {  
    runTest();  
    date_of_last_test = current_date;  
}
```

```
// current_date = 01/01/00  
// date_of_last_test = 28/12/99
```

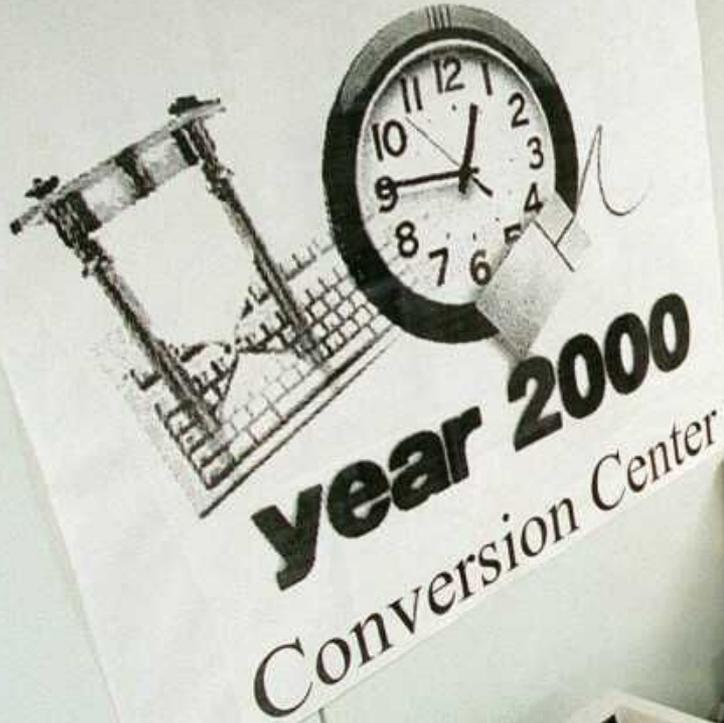
```
days_since_last_test = current_date - date_of_last_test; // -36,520 days
```

```
if (days_since_last_test > 3) {  
    runTest();  
    date_of_last_test = current_date;  
}
```

Cascading Failures



The Global Response



Millennium bug

There's a Bug about. It's time to check it out.

For all you home-owning folks, there's a Millennium Bug. For you! Some that'll cause more trouble than others, and you'll have to be vigilant about them. Here's how to check for them.

home check!

-  **Your home:**
Your guide to household appliances **2**
-  **PC users:**
The bugs about your home computer **4**
-  **The test:**
Test your PC with our check-lists **5**



millennium bug!

So-called 'millennium bugs' could cause you the headache of a lifetime. Here's how to avoid them.

The year 2000 is a special one for many people. It's the start of a new millennium. But it's also a time when many people will be checking their computers for bugs.

But what about your PC? Will it be a bug?

Yes, it can be. There are many bugs out there that could cause you a headache. Here's how to avoid them.

is it?

When it comes to bugs, there are many types. Some are harmless, some are not. Here's how to tell the difference.

Appliances: Dishwashers, Stoves, Washers, Dryers, Freezers, A/C Units, Boilers, Pumps, Fans, Lights, Sinks.

Household Systems: Air Conditioning, Central Heating, Drainage, High Voltage, Gas, Sewer, Plumbing, Electrical, Fire, Alarm, Security, Satellite, TV, Cable, Phone, Fax, Modem, Internet.

Software: Operating Systems, Applications, Databases, Spreadsheets, Word Processing, Graphics, Multimedia, Games, Security, Backup, Recovery, Migration.

Security of Your Information and System: This is the most important bug of all. It's the one that could cause you the most trouble. Here's how to protect your information and system.

manufacturers

There are many manufacturers of home appliances and systems. Here's a list of some of the most popular ones.

Appliances: Amana, Electrolux, Frigidaire, GE, Kenmore, KitchenAid, Maytag, Whirlpool.

Household Systems: Carrier, Trane, Lennox, Rheem, Amana, Goodman, York, Carrier, Trane, Lennox, Rheem, Amana, Goodman, York.

Software: Microsoft, Apple, Oracle, IBM, Sun, HP, Dell, Compaq, Gateway, Acer, Asus, Sony, Samsung, LG, Philips, JVC, Panasonic, Sharp, Hitachi, Aiwa, Pioneer, Kenwood, Yamaha, Bose, Sennheiser, JBL, Bowers & Wilkins, Harman International, Harman International, Harman International.



Solutions to the Millenium Bug



1. Date expansion

Solution

How much time it buys you

- Use 4 digit placeholders for years and re-code software
- E.g. **18/06/97** becomes **18/06/1997**

Lasts until 31/12/9999

2. Windowing

Solution

- Assume dates are associated with a specific period
- A University founded in 1955 can assume a graduation date between:
 - **0-54** refers to **2000-2054**
 - **55-99** refers to **1955-1999**

How much time it buys you

Depends upon the window that you choose

For this example the solution lasts until 31/12/2054

3. Date repartitioning

Solution

How much time it buys you

- Use 6 digits for dates but represent them as **DDDDYY** instead of **DDMMYY**
- 02/02/1995 -> 032095
- 31/12/2002 -> 364102

Lasts until 31/12/2899

Pre-Millennium Hiccups





Kindergarten

MARY BANDAR

INVITATION

Please join us



SEPTEMBER 1992 9:00 AM

Elementary School

123 Sunshine Street,
Summerland, CA 90210



Post-Millennium Mayhem

0620
18598989
474849 13
393983 17
85785 01
9778 14

CANCELLED
CANCELLED
CANCELLED
CANCELLED
CANCELLED



Preparing for the Unknown

1. Proactive mitigation
2. Contingency planning
3. Public awareness campaigns

Was it
worth it?



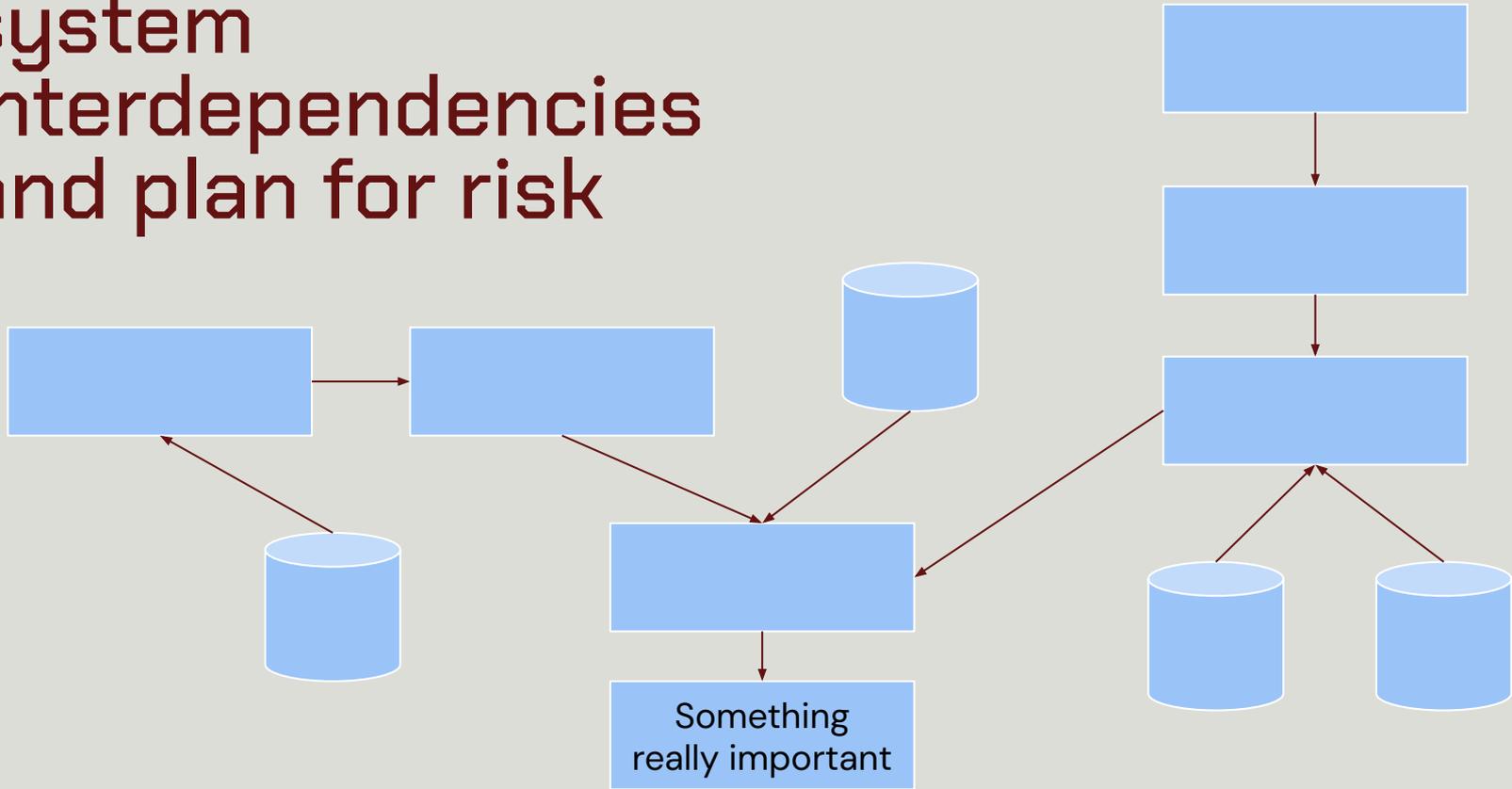
LESSONS FOR LEAD DEVS

1) Code has a shelf life



BEST BY AUG 18

2) Recognise system interdependencies and plan for risk



COMMUNICATE

3) Emphasise proactive
management and
communication



Lessons Learned, Future Prepared

- 1) Plan for the expiry of your code
- 2) Have a backup plan
- 3) Communication is crucial

NEWS

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Newsbeat

DON'T set your iPhone to 1 January 1970 or you'll break it

© 17 February 2016



GETTY IMAGES

Apple is warning iPhone users not to fall for an internet hoax that leaves handsets useless and irreparable.

Seconds since 1st January 1970

Now: 1,750,170,769

Max: 2,147,483,647 ($2^{31} - 1$)

>> **03:14:07 UTC on Tuesday, 19 January 2038**





Thanks!



Amir Safavi
Staff Software Engineer at Google

Don't forget
about 2038!

