AN ILLUSTRATED HISTORY OF

POSTGRES(QL)

PETER VAN HARDENBERG

- Started Heroku Postgres, which runs >1M Postgres customer databases.
- Alright at writing SQL.
- Started with PostgreSQL in 2001 for arctic oceanography data.
- I've read the whole Postgres manual.
- Born in Canada, live in San Francisco.
- @pvh / pvh@pvh.ca

INTRODUCTION

MEET POSTGRES

MEET POSTGRES

BORN IN CALIFORNIA IN 1985

MEET POSTGRES

BUILT BY A GLOBAL COMMUNITY SINCE 1996

MEET POSTGRES

TRUSTED BY COMPANIES AROUND THE WORLD

CHAPTER ONE

STONEBRAKER'S POSTGRES

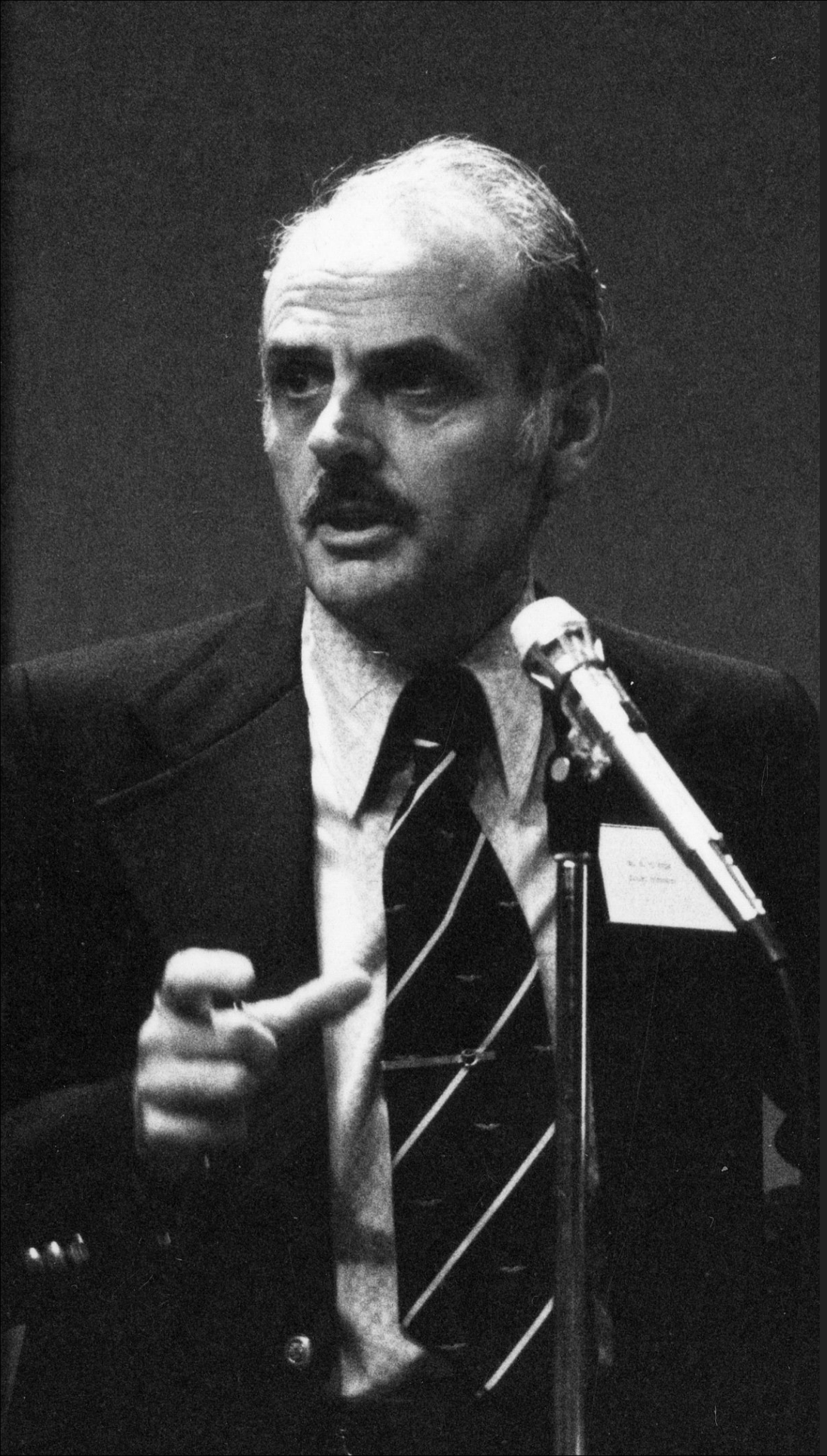
BERKELEY, CALIFORNIA, 1976

MICHAEL STONEBRAKER IS WORRIED

TEXT

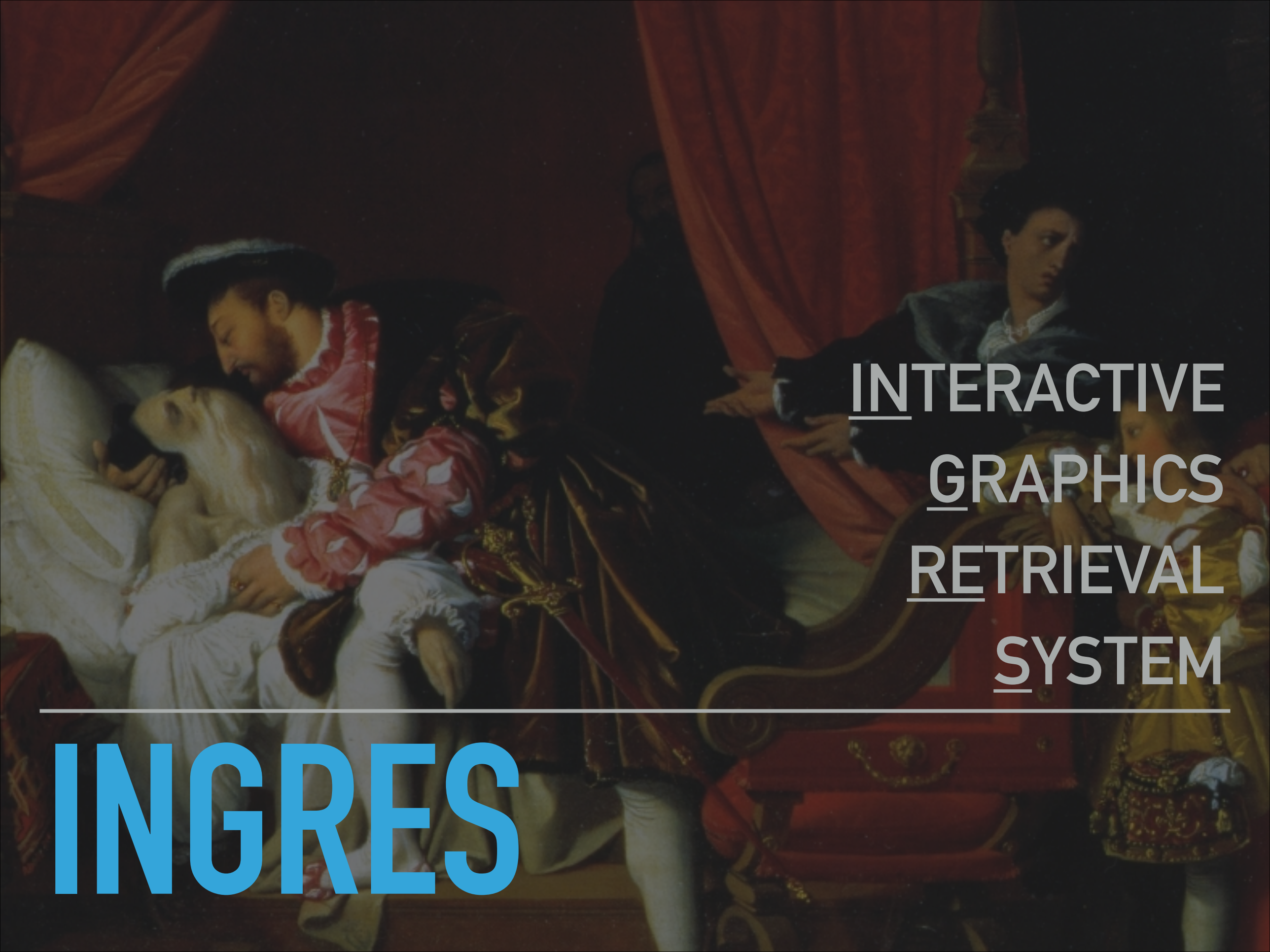
ONCE YOU GET IN, YOU'VE GOT FIVE YEARS TO GET FAMOUS, THAT'S IT.

Michael Stonebraker



EDGAR F. CODD

RELATIONAL ALGEBRA



INTERACTIVE GRAPHICS RETRIEVAL SYSTEM

INGRES

```
range of E is EMPLOYEE
    retrieve into W
    (COMP = E.Salary / (E.Age - 18))
    where E.Name = "Jones"
```

QUEL (QUERY LANGUAGE)

SOLD TO

COMPUTER
ASSOCIATES

INGRES

BERKELEY RESEARCH LABS

- Interdisciplinary groups
- Lots of collaboration
- Limited duration
- Real-world applications
- Path to commercialization
- BSD license (usually)
- Examples: Ingres, Postgres, RISC, Spark, and many more.

WHAT COMES POST INGRES?

POST-GRES.

STAKE OUT A CONTROVERSIAL POSITION, AND PROVE IT CORRECT.

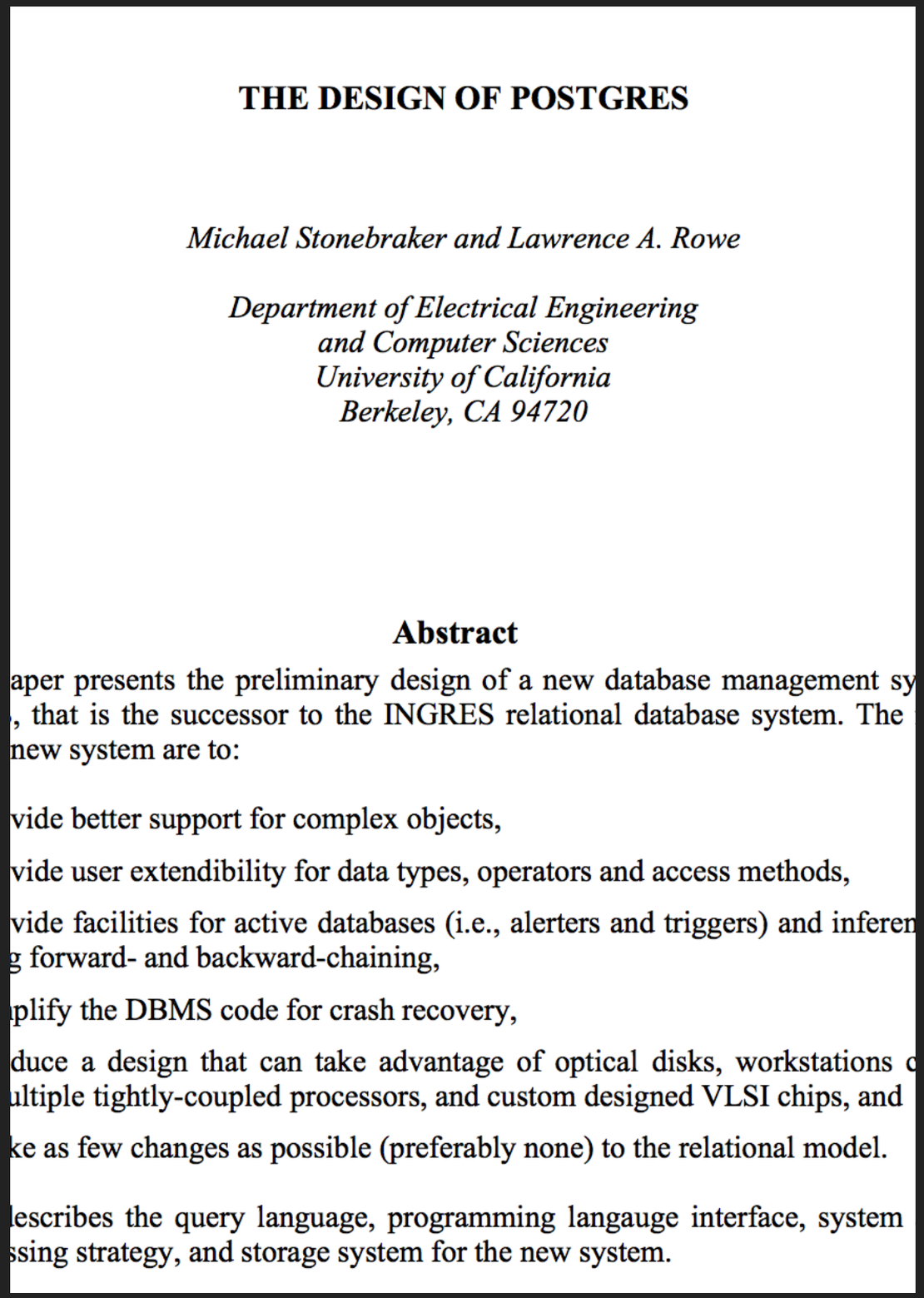
Michael Stonebraker

STONEBRAKER AND ROWE

THE DESIGN OF POSTGRES

THE DESIGN OF POSTGRES, 1986

- Designed to combine applications & traditional business data
- Response to Ingres' shortcomings
- Lots of extensibility
- Adds a "rules engine"
  - (predates modern constraints)



THE DESIGN OF POSTGRES

Michael Stonebraker and Lawrence A. Rowe

Department of Electrical Engineering
and Computer Sciences
University of California
Berkeley, CA 94720

Abstract

aper presents the preliminary design of a new database management sy
, that is the successor to the INGRES relational database system. The
new system are to:

vide better support for complex objects,

vide user extendibility for data types, operators and access methods,

vide facilities for active databases (i.e., alerters and triggers) and inferen
g forward- and backward-chaining,

plify the DBMS code for crash recovery,

duce a design that can take advantage of optical disks, workstations c
ultiple tightly-coupled processors, and custom designed VLSI chips, and

ke as few changes as possible (preferably none) to the relational model.

lescribes the query language, programming langauge interface, system
ssing strategy, and storage system for the new system.

"DEMOWARE"

1987

POSTGRES 1.0 RELEASED

1989

POSTGRES 2.0, THE FIRST REWRITE

1990

POSTGRES 3.0, THE SECOND REWRITE

(ALSO, EXTENSIBILITY SUPPORT ADDED)

1991

STONEBRAKER FOUNDS ILLUSTRA TO COMMERCIALIZE POSTGRES

1992

POSTGRES 4.2

BERKELEY POSTGRES LAB ENDS

1994

POSTGRES IS FINISHED

THE END

... OR IS IT?

CHAPTER TWO

ANDREW AND JOLLY

BERKELEY, CALIFORNIA, 1994

ANDREW AND JOLLY ARE BORED

IT SEEMED LIKE IT WOULD BE ABOUT AS HARD AS A UNIVERSITY CLASS PROJECT.

Jolly Chen

WE WOULD RECRUIT THE SMARTEST [STUDENTS] WE COULD FIND, GIVE THEM WONDERFUL EQUIPMENT, AND THEY WOULD BASICALLY DIE WRITING CODE FOR US.

Michael Stonebraker

```
range of E is EMPLOYEE
    retrieve into W
    (COMP = E.Salary / (E.Age - 18))
    where E.Name = "Jones"
```

BEFORE: QUEL

```
select (e.salary / (e.age - 18))
    as comp
from employee as e
where e.name = "Jones"
```

AFTER: SQL

UNIVERSITY

POSTGRES 4.2

NOW WITH SQL!

POSTGRES95

SQL SUPPORT?

- No window functions
- No foreign keys
- No inner joins
- No NULL
- No constraints
- No MVCC
- Not much of anything!

SHIP IT

PROFILE OF AN EARLY ADOPTER

- Using a SQL database at work
- Wanted one to run at home
- Didn't have money to spend
- Didn't have OS supported by other databases
- Postgres kinda worked

CHAPTER THREE

POSTGRESQL IS BORN

BERKELEY, CALIFORNIA, 1996

ANDREW AND JOLLY ARE BUSY

THE INTERNET, 1996

BRUCE AND MARC ARE TIRED OF WAITING

THE BIRTH OF POSTGRESQL

> On Tue, 23 Apr 1996, Jolly Chen wrote:
>
> > I've posted a TODO list on the postgres95 web site
> > (http://s2k-ftp.CS.Berkeley.EDU:8000/postgres95/www/todo.html)
> > I've casually sorted the list by priority and I have some editorial
> > comments on some of them.
> >
> > If all the items on the TODO list were completed, postgres95 would be
> > much improved, and would really be a viable replacement for commercial
> > RDBMSs in some settings. Some of the items require quite a bit of work
> > and deep knowledge of postgres95 internals, though. **We would need a few**
> > **contributors with quite a lot of volunteer hours to make this happen**
> > **anytime soon. (A large number of contributors each with only a little**
> > **bit of time to contribute would not be equivalent)**

THE BIRTH OF POSTGRESQL: SCRAPPY STARTS THE REPOSITORY

Date: Mon, 08 Jul 1996 22:12:19 -0400 (EDT)
From: "Marc G. Fournier" <scrappy@ki.net>
Subject: [PG95]: Developers interested in improving PG95?
To: Postgres95 Users <postgres95@oozoo.vnet.net>

Personally, I think that both Jolly and Andrew have done a fantastic job of bringing it to its currently level, but they, like most of the ppl on this list, have full time jobs that sap alot of their time...

...so, unless someone out there has already done this, and unless Jolly/Andrew tell me I can't (guys?)...I'm going to go ahead with what I wanted to do a few months ago...setup a development site similar to what is done with FreeBSD...

First stage will be to get a cvs archive of postgres 1.01 online tonight, with a sup server so that everyone has access to the source code.

If anyone has any patches they wish to submit based off of 1.01, please send them to postgres@ki.net and I'll commit those in as soon as cvs is up and running.

Unless there are any disaggremenets with this (or someone else has done this that I missed in mail...sorry if I did...)...I'll send out further data on this as soon as its up and running...

THE BIRTH OF POSTGRESQL: BRUCE THE BUG TRACKER

Date: Mon, 15 Jul 1996 00:28:34 -0400 (EDT)
From: Bruce Momjian <maillist@candle.pha.pa.us>
Subject: [PG95]: Future of Postgres95 development
To: postgres95@oozoo.vnet.net (Postgres95)

I think it would be great if Jolly and Andrew would continue to gather patches from postings to this list, and perhaps help suggest solutions to some of the more complex bugs left in the system (corrupt databases?).

If not, where are we going?

I am willing to bundle up a new release based on patches posted to this group since the release of 1.01.

I am also willing to start gathering a list of known bugs and coordinate efforts to develop patches to fix them.

After these steps, I am willing to post the todo list, and ask for volunteers to start work on them.

NOW ALL WE NEED IS A

NAME

LESS FUNNY IN 1997

POSTGRES95

From: "Vadim B. Mikheev" <vadim@sable.krasnoyarsk.su>
Date: Wed, 18 Sep 1996 15:04:22 +0800
Subject: Re: [PG95-DEV] postgres2.0

Marc G. Fournier wrote:

[...]

> How about PostgresV6?

And it's good name. But Ingres & Postgres are different in language (not only), and Postgres & Postgres'95 too, so why not to change prefix now again ?

> Please...though...**just not Postgres/SQL**...it just **doesn't slide off the tongue nicely** :(

Vote against too.

THE BIRTH OF POSTGRESQL: NAMING

From: "Marc G. Fournier" <scrappy@ki.net>
Date: Tue, 22 Oct 1996 04:35:34 -0400 (EDT)
Subject: Re: [PG95-DEV] postgres.org

On Tue, 22 Oct 1996, Julian Assange wrote:
>
> Does anyone know what is happening with the delegation of the
> postgres domains? Indirect.com was going to hand them over,
> but as yet has not.

Last week, I sent an email off to the 'admin contact' asking for a status, but have heard nothing... Which is okay.

We had that major discussion on name changes, and it seemed that the majority were in favor of PostgreSQL...so let's do it.

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THE BIRTH OF POSTGRESQL: NAMING

```
commit 9b41da6ce48e3bed6730faa6347a5461175cff83
Author: Bruce Momjian <bruce@momjian.us>
Date:   Wed Dec 11 00:28:15 1996 +0000

    Rename postgres95 to PostgreSQL.
    Add comment for SELECT NULL
```

AND SO IT CAME TO BE

"POSTGRESQL"

THE BIRTH OF POSTGRESQL: NAMING

From: Tom Lane <tgl@sss.pgh.pa.us>
Subject: The name of the game
Date: 2006-07-13 03:42:54

It might help to explain that the pronunciation is "post-gres" or "post-gres-cue-ell", not "post-gray-something".

I heard people making this same mistake in presentations at this past weekend's Postgres Anniversary Conference :-(**Arguably, the 1996 decision to call it PostgreSQL instead of reverting to plain Postgres was the single worst mistake this project ever made.**

It seems far too late to change now, though.

regards, tom lane

JUST SAY IT LIKE THIS

"POST – GRES"

1997

CHAPTER FOUR

THE GLOBAL DATABASE

THE GLOBAL DATABASE

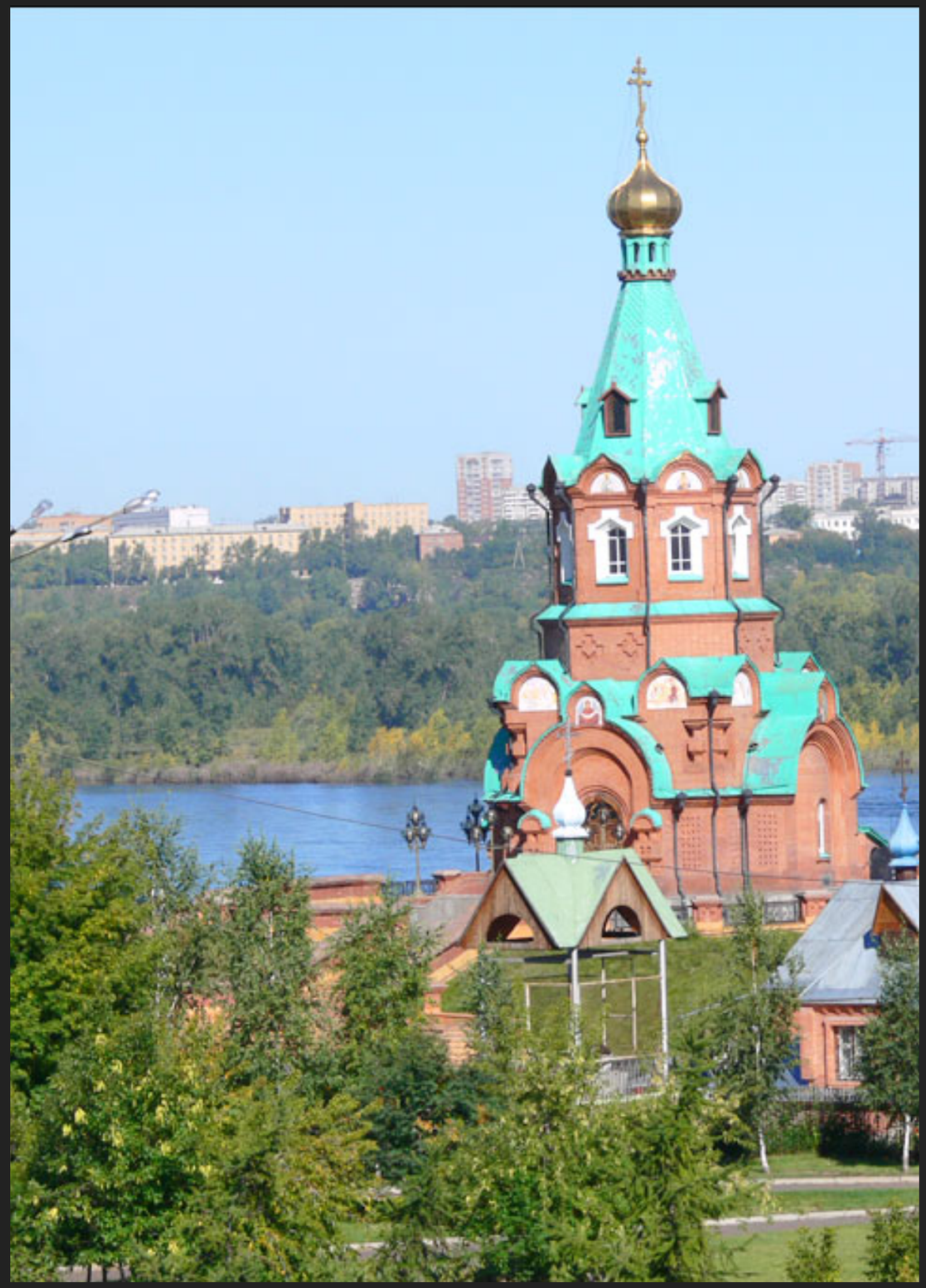
POSTGRES IS EVERYWHERE

A GLOBAL PROJECT FROM THE BEGINNING: 1997

- USA
- Canada
- Russia
- Japan
- Australia
- Germany

VADIM MIKHEEV

- The original Russian contributor
  - Support for MVCC
  - Write-Ahead-Log
  - Triggers
  - Contributed to Russian support
  - Retired from core team today



ОЛЕГ БАРТУНОВ & ФЕДОР СИГАЕВ

- Indexes & non-atomic data types
  - Generalized Search Tree
  - Generalized Inverted Index
  - K-Nearest Neighbors Index
  - Full Text Search
  - hstore/JSONB
- "The Mad Russians"

GiST for PostgreSQL

CHAPTER FIVE

COMMERCIALIZATION

THE FIRST SERIOUS CONTENDER

GREATBRIDGE

$40.000.000 USD

NED LILLY

VP OF HACKER RELATIONS

TOO EARLY IS THE SAME AS BEING WRONG

GONE IN 16 MONTHS

EDB™

POSTGRES

THE POSTGRES COMPANY

ENTERPRISEDB

RUSSIA'S
DEVELOPMENT HOUSE

POSTGRES PROFESSIONAL

COMMERCIAL POSTGRES

FORKS

POSTGRES IS

CLEAN CODE

POSTGRES IS

FREE CODE

→ postgres git:(master) ✗ cat COPYRIGHT
PostgreSQL Database Management System
(formerly known as Postgres, then as Postgres95)
Portions Copyright (c) 1996-2016, PostgreSQL Global Development
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MASSIVELY PARALLEL PROCESSING DATABASES

- Netezza (7.2)
- GreenPlum (7.4)
- RedShift (8.0)
- AsterData (8.4)
- CitusData (9.0)

RedShift & GreenPlum are both merging newer code now.

CitusData is now an OSS extension instead of a fork .

CLUSTERED POSTGRESQL

- Translattice
- StormDB
- PostgresForest
- Postgres-XC
- Postgres-XL
- Postgres Pro Enterprise
- ... and more

PIPELINE DB (9.5)

NEW DATABASES

FORKS MAKE THE COMMUNITY STRONG

CHAPTER SIX

THE MODERN COMMUNITY

NOBODY OWNS POSTGRES

CONSENSUS RULES

[HACKERS]

MAILING LIST CULTURE

IN SEPTEMBER... OR SO

ANNUAL RELEASES

MONTH-LONG REVIEW PARTIES

COMMITFESTS

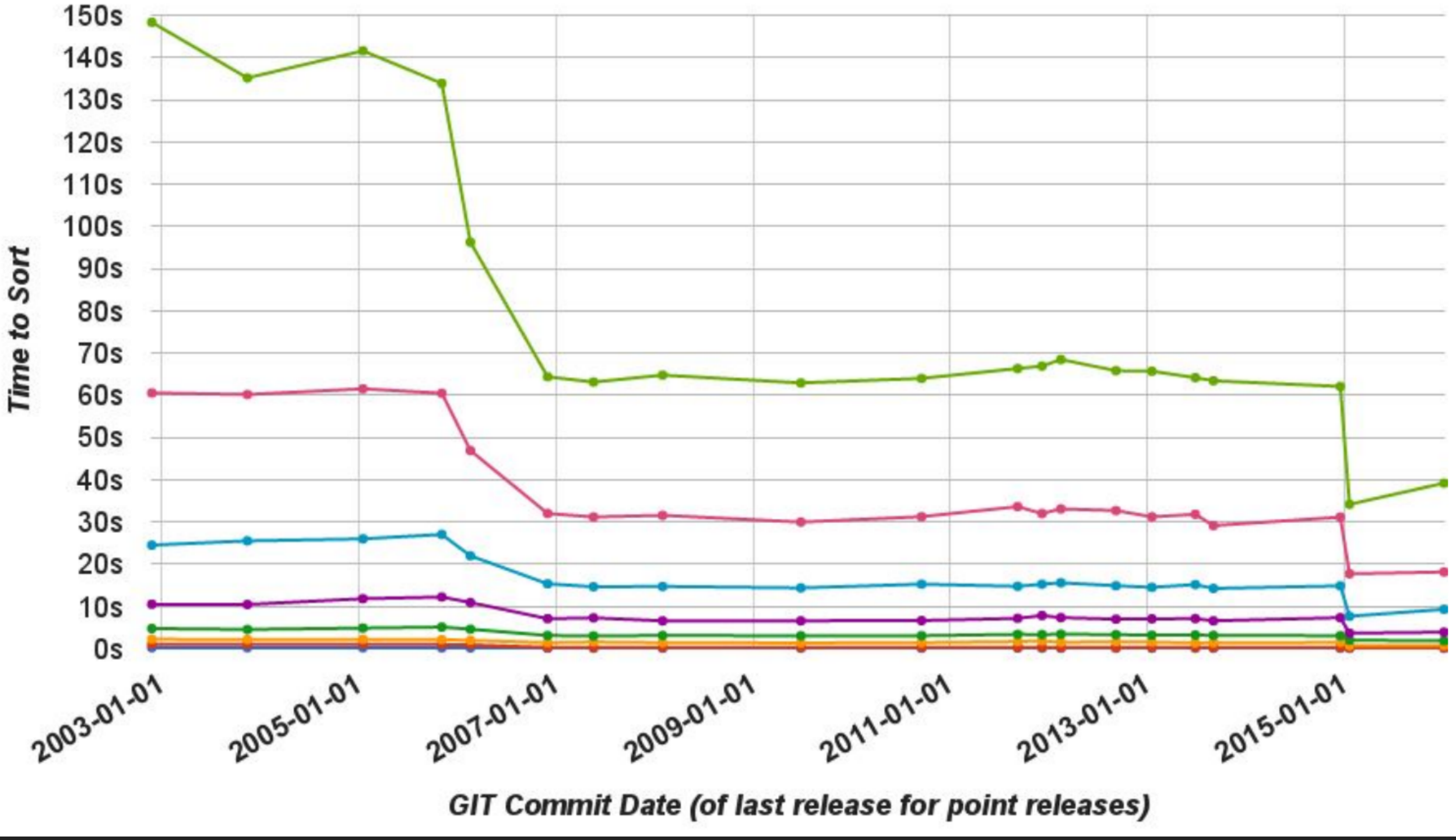
GETTING A PATCH ACCEPTED IN POSTGRESQL

MAILING LIST DISCUSSION

COMMITFEST PROCESS

HOW FEATURES GROW

INCREMENTALISM


Time to Sort
150s
140s
130s
120s
110s
100s
90s
80s
70s
60s
50s
40s
30s
20s
10s
0s
2003-01-01
2005-01-01
2007-01-01
2009-01-01
2011-01-01
2013-01-01
2015-01-01
GIT Commit Date (of last release for point releases)

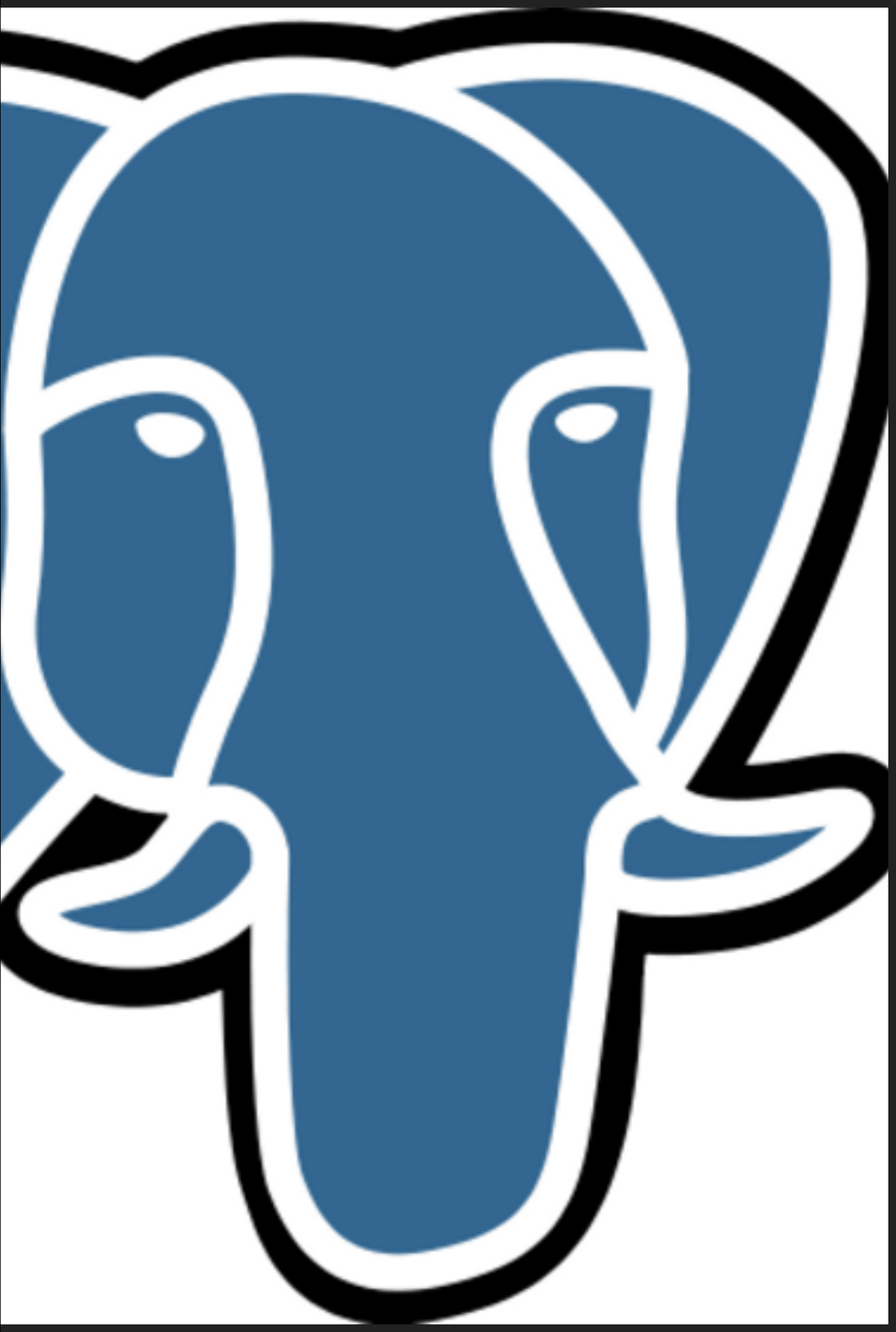
DURABILITY

7.1	WAL	crash-recovery
8.2	Warm Standby	WAL application on standby
9.0	Hot Standby	Run queries on standby
9.0	Streaming replication	WAL sent continuously
9.1	Synchronous replication	WAL can be confirmed by standby
9.4	Logical replication	WAL can be represented as logical records

REMOTE DATA ACCESS

7.1	DBLink	query remote databases
8.4	SQL/MED “infrastructure”	no user-facing features
9.1	Foreign Data Wrappers	very user-facing support
9.2	FOREIGN TABLE	support for defining external tables
9.3	postgres_fdw	postgres FDW in core
9.6	FOREIGN SCHEMA	maintain an external schema

FEATURES GROW



EPILOGUE

MIRACULOUS POSTGRES

STONEBRAKER WAS RIGHT.

TIMING IS EVERYTHING.

PEOPLE MAKE POSTGRES.

WE'RE GROWING FASTER THAN EVER.

Thanks to
Bruce Momjian,
Oleg Bartunov,
Jolly Chen,
Marc Fournier,
Greg Stark,
Tatsuo Ishii,
Magnus Hagander,
Dave Page,
and everyone else
who contributed interviews,
figures, or reviews.

Inaccuracies are my own!

THANK YOU!

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30 YEARS OF POSTGRES