

Successful Scalability Principles - Part I

Ronald Bradford
<http://ronaldbradford.com>

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OUTLINE

Necessary Principles

- System Architecture
- Data Availability
- Best Practices
- Being proactive



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ACTION

Integrated monitoring and instrumentation



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EXAMPLE



• Question:

- How do you know when your server is down or not accessible?

• Answer:

- The users will let us know.

HOW



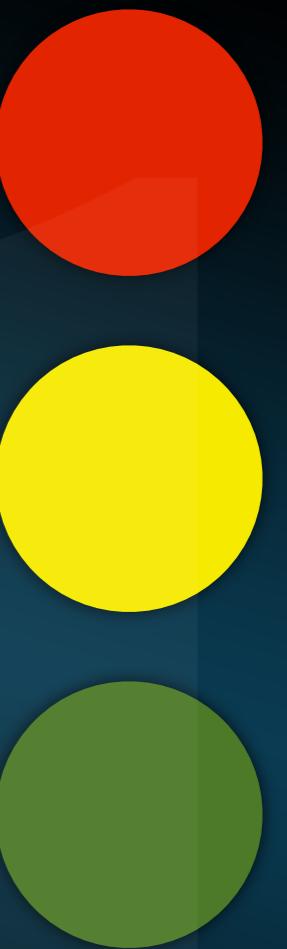
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- Monitoring/Alerting
 - Graphical
 - Historical
 - Necessary
 - Generally missing/incomplete
 - Useless for real-time analysis

- Monitoring/Alerting
 - Graphical
 - Historical
 - Necessary, Generally missing/incomplete
 - Useless for real-time analysis
- REACTIVE**

HOW



<http://rb42.com/monitoring-needs>



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- Dashboard
 - The state of NOW
 - Near real-time statistics
 - Sampling at 1s/3s/5s
 - e.g. 0.1% of throughput

<http://rb42.com/monitoring-needs>

HOW

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HOW



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Instrumentation

- Important to business viability
 - e.g. orders per minute (KPI)
 - page load time
- Seamless implementation
 - i.e. no code changes to view real-time
 - extensible

-
- Instrumentation
 - Important to business viability
 - e.g. Success per minute (KPI)
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 - seamless implementation
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 - extensible

WHY

Monitoring +
Instrumentation =
Preemptive Analysis



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HOW NOT TO

digg™

Digg has broken an axle.

We might have to sell some oxen but we'll be back on the trail soon.

1955 diggs
1984 diggs
1889 diggs

5 seconds

Digg v4: 5384.75ms

About Digg Advertise Partners API & Resources Blogs Contact Us Jobs



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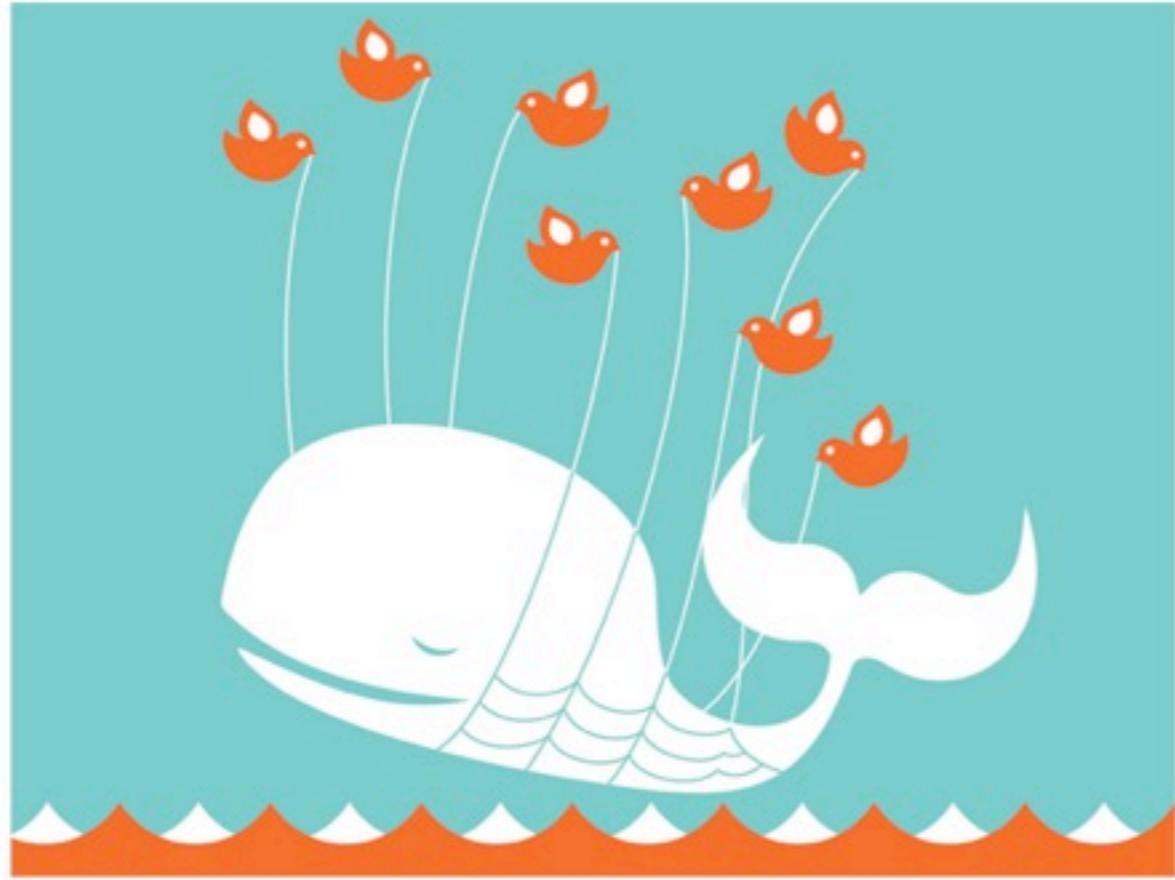
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HOW TO

twitter

Home Public Timeline Help

Twitter is over capacity.
Too many tweets! Please wait a moment and try again.



© 2008 Twitter About Us Contact Blog Status API Help Jobs TOS Privacy



< 1 second



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- Preemptive Analysis
 - Fail early
 - Faster user response
 - Less physical resource impact

TIP



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- Have a status website
 - allow for comments (e.g. blog)

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- Have a public dashboard website

- Have a status website
 - allow for comments (e.g. blog)
- Have a public dashboard website

Host them somewhere else!

A screenshot of a web browser displaying the Twitter Status page at status.twitter.com. A large red arrow points from the browser's address bar to the "Powered by Tumblr" link in the bottom right corner of the page.

The page shows three entries:

- THU JUL 26TH**: **Twitter Site Issue- Resolved** 2 weeks ago
Update: This issue has been resolved.
Users may be experiencing issues accessing Twitter. Our engineers are currently working to resolve the issue.
2,244 Tweet
- THU JUN 21ST**: **Twitter Site Issue** 1 month ago
Users may be experiencing issues accessing Twitter. Our engineers are currently working to resolve the issue.
Update: The issue has stabilized and all services are restored.
9,914 Tweet
- TUE JUN 19TH**: **Email delivery issues** 1 month ago
Some users may experience a delay receiving signup confirmation and password reset emails. Our engineers are working to resolve

Updates on the status of the [Twitter](#) service.

Related Links

- [Official Company Blog](#)
- [Official Help Documents](#)
- [Developer Community](#)
- [Archive](#)
- [RSS](#)

Powered by [Tumblr](#)



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status.aws.amazon.com zappos status page

AWS Service Health Dashboard ... zappos status page - Google Se... +

amazon web services SERVICE HEALTH DASHBOARD

[Amazon Web Services](#) » [Service Health Dashboard](#)

Current Status - Aug 12, 2012

Amazon Web Services publishes our most up-to-the-minute information on service availability in the table below. Check back here any time to get current status information, or subscribe to an RSS feed to be notified of interruptions to each individual service. If you are experiencing a real-time, operational issue with one of our services that is not described below, please inform us by clicking on the "Report an Issue" link to submit a service issue report.

North America	South America	Europe	Asia Pacific	Report an Issue
Current Status				Details
Amazon CloudFront				Service is operating normally.
Amazon CloudSearch (N. Virginia)				Service is operating normally.
Amazon CloudWatch (N. California)				Service is operating normally.
Amazon CloudWatch (N. Virginia)				Service is operating normally.
Amazon CloudWatch (Oregon)				Service is operating normally.
Amazon DynamoDB (N. California)				Service is operating normally.
Amazon DynamoDB (N. Virginia)				Service is operating normally.
Amazon DynamoDB (Oregon)				Service is operating normally.
Amazon Elastic Compute Cloud (N. California)				Service is operating normally.
Amazon Elastic Compute Cloud (N. Virginia)				Service is operating normally.
Amazon Elastic Compute Cloud (Oregon)				Service is operating normally.



ACTION

Seamless automated server deployment



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EXAMPLE



Actual Client

- 100+ production database servers
- Full-time DBAs
- No automated software installation
- No single documented installation process
- No version control
- No auditing/verification



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Basics

- Version Control
- Automated Build & Release
- Integrated Monitoring

HOW

Intermediate

- Health Checks
- Runtime config file management
- Benchmarking



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Advanced

- Server request queue
- Automated discovery
- Proactive scaling (up & down)

- Consistent and timely provisioning
- Unattended installation with correct and reproducible configuration
- Automated discovery





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ACTION

Disaster
is
inevitable



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EXAMPLE



Question:

Have you ever performed a database recovery?

Answer:

No, why?



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EXAMPLE



Consultant:

Do you know that your daily backups only recover the data up to that time (e.g. I am). You know you have lost all your sales(aka \$2 million sales today) and data changes since then.

Customer:

No, I didn't know that.



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HOW



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HOW

- Have a DR plan



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HOW

- Have a DR plan
- Documented



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HOW

- Have a DR plan
- Documented
- Tested



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- Have a DR plan
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HOW

- Have a DR plan
 - Documented
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 - Timed
 - Verified



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HOW



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HOW

- Test under production conditions



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HOW

- Test under production conditions
- System Load



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- Test under production conditions
 - System Load
 - Database Size

- Test under production conditions
 - System Load
 - Database Size
 - End to End

- Know and practice for disaster
- Provide confidence to management
- Be as confident about your recovery as your scalability



SIDE BAR!

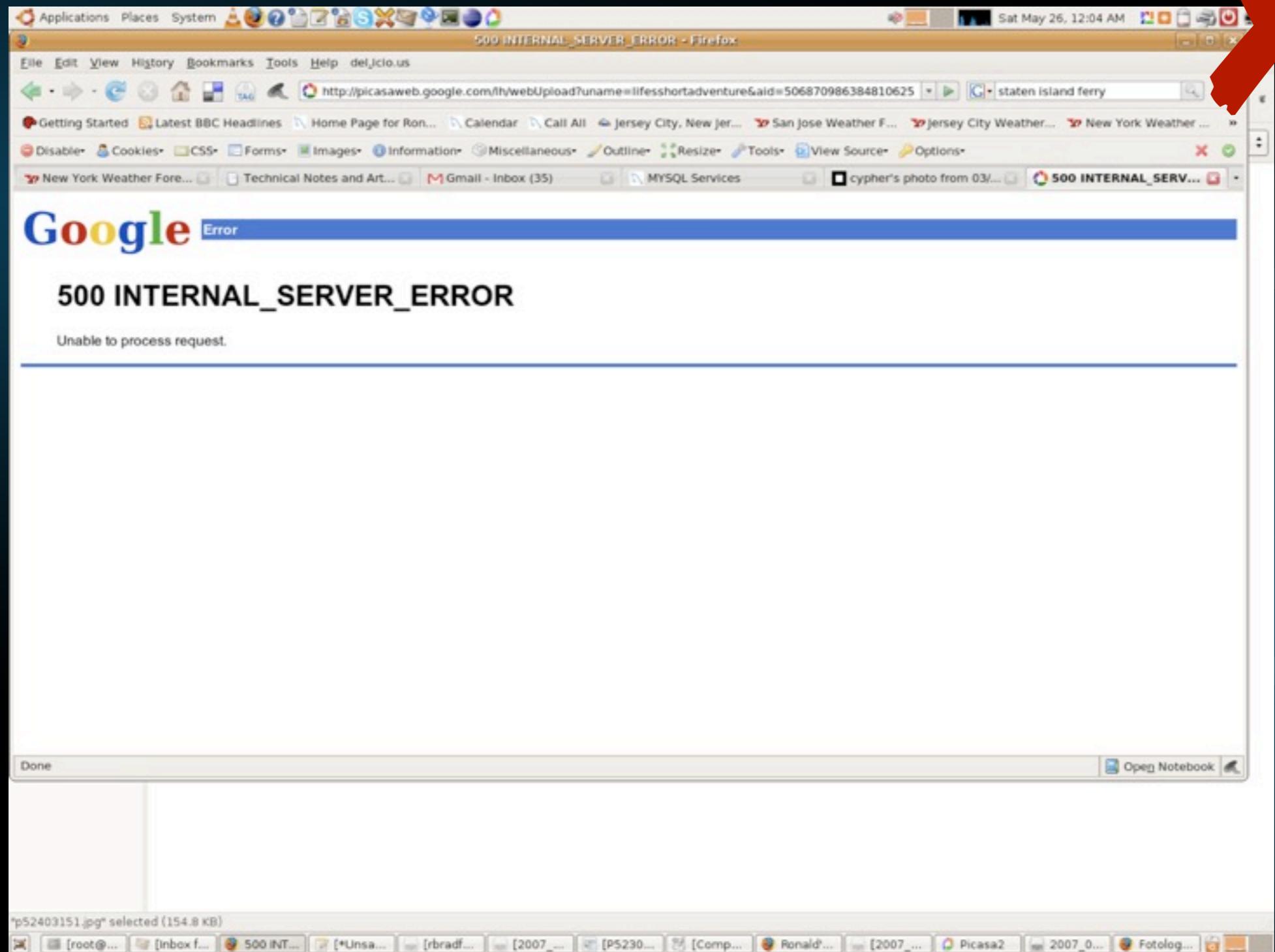
What does your website
look like when it's down?



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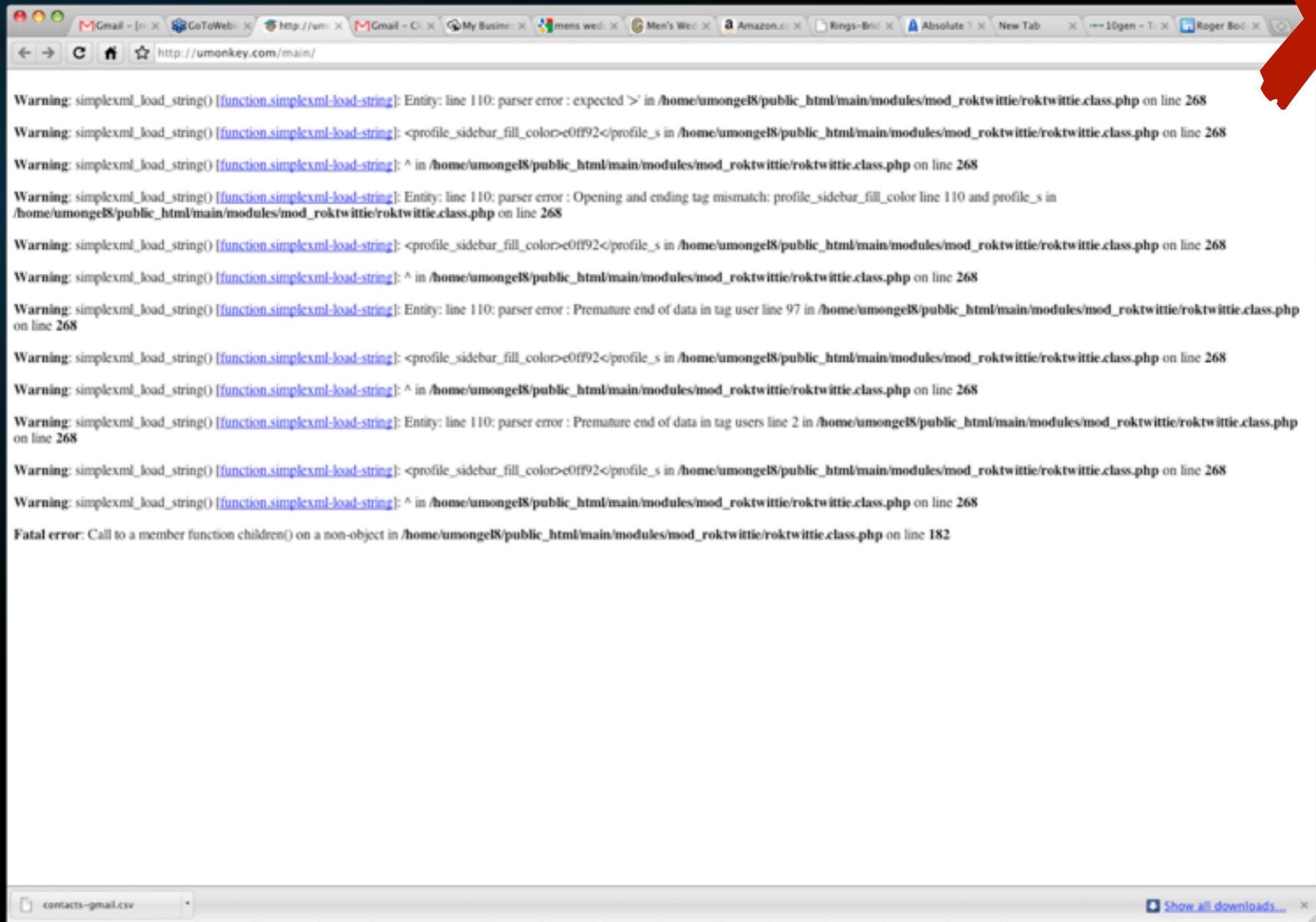
SIDE BAR



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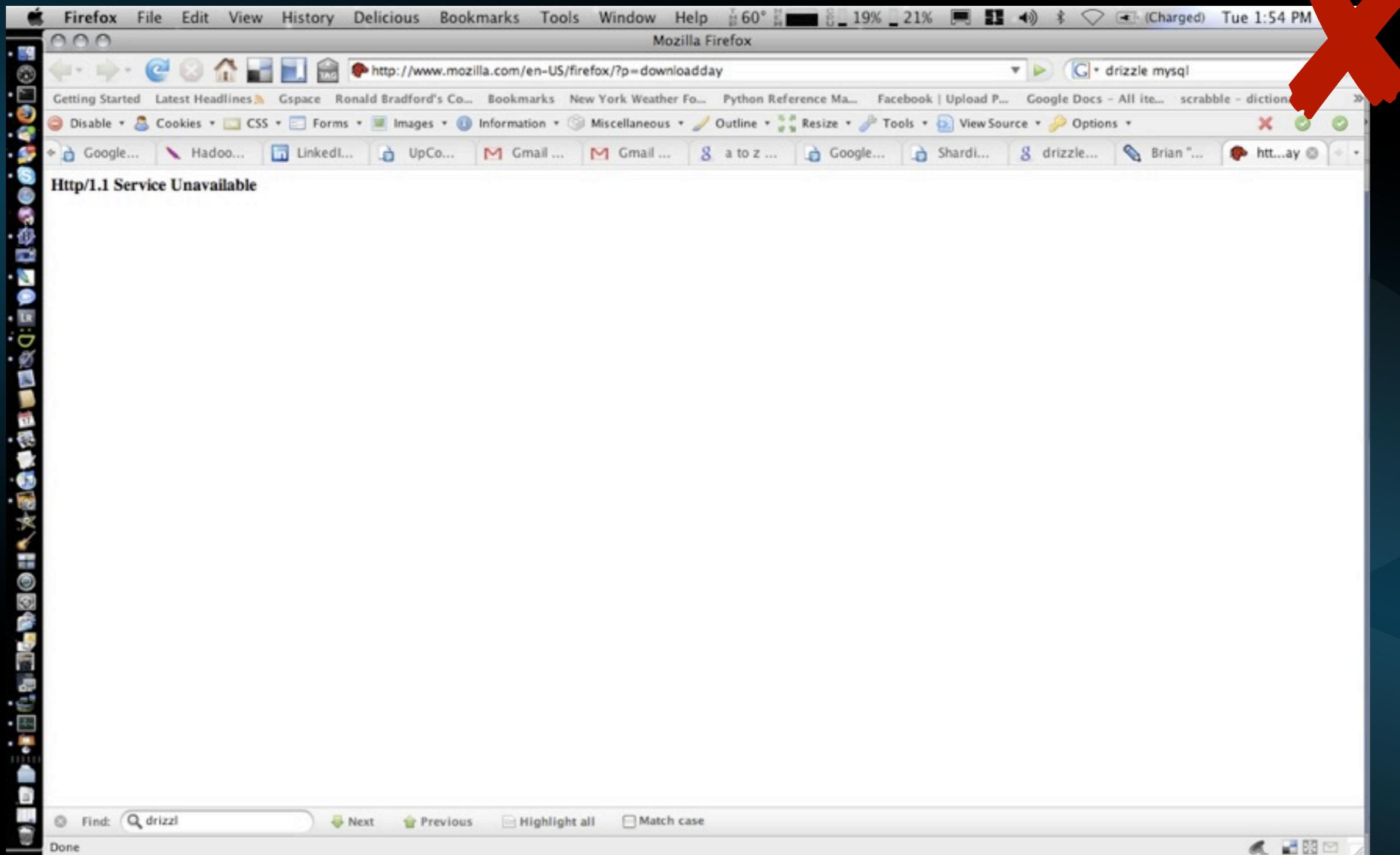
SIDE BAR



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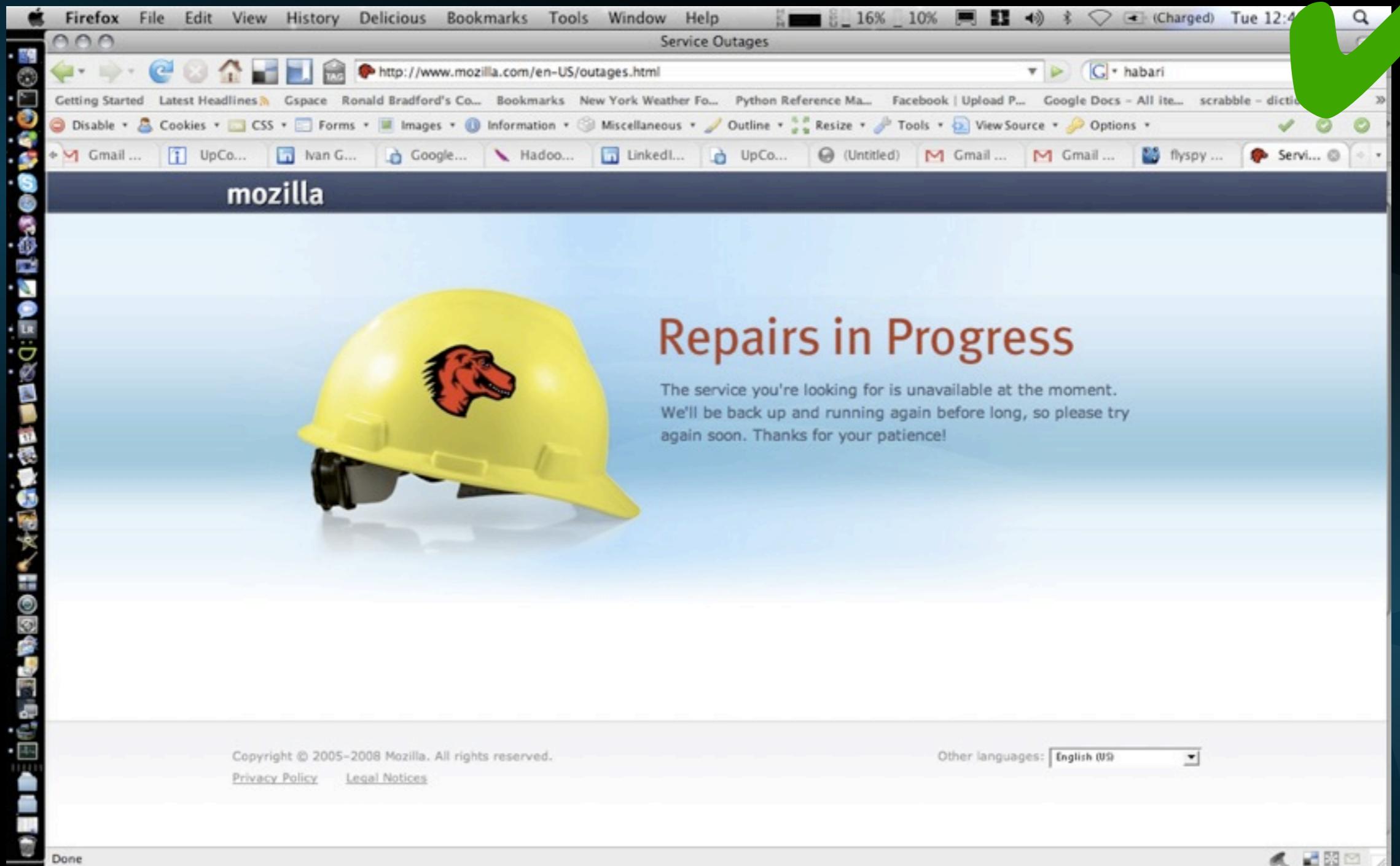
SIDE BAR



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SIDE BAR



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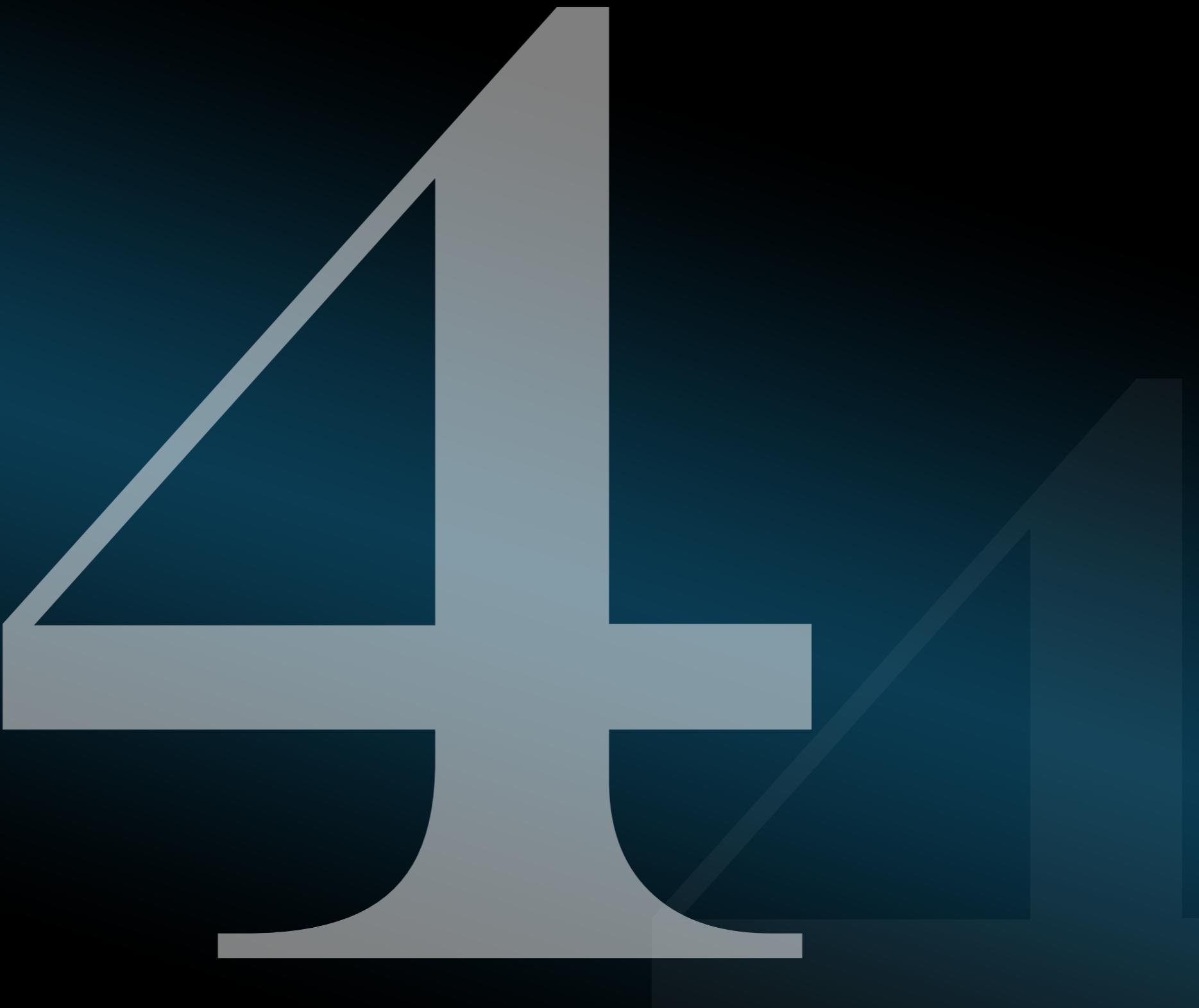
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SIDE BAR



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ACTION

Application Programming Interface



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EXAMPLE



**3 access paths to same data
with different business rules**

- Public API
- Application web site
- Batch processes

WHY AN API?

- One code path for business functionality
- Implied business documentation
- Enforced data exchange standard
- **Testability**



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- Technology independence
- Business specification dependence (API)
- Stress testable



REQUIREMENTS

- Input Specification
- Output Specification
- Standard for data communication
- Throughput needs
- Latency requirements



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SIDE BAR!

Testing is not about
what works, it's about
breaking your software



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ACTION

Support different
levels of data
availability



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HOW



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HOW

Data can be:



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HOW

Data can be:

- Read & Write



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Data can be:

- Read & Write
- Read

Data can be:

- Read & Write
- Read
- Cached

Data can be:

- Read & Write
- Read
- Cached
- No Access

EXAMPLE

Development Team:

We need a maintenance
window for software
upgrades and new
releases.



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EXAMPLE

Management Team:

No Downtime



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EXAMPLE

Development Team:

**But we need this to fix
problems and improve
performance.**



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EXAMPLE

Management Team:

No Downtime



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EXAMPLE

What is your
definition of no
downtime?



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- Support downtime
 - Software upgrades
- Support disasters
- Reduce high load
- Support partial functionality

- Meet the business needs of availability
- There are ways to give greater perception of availability





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ACTION

Support different
scalability
principles



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HOW

- Read Scalability
- Write Scalability
- Caching



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HOW

- Depends on your R/W ratio
- Depends on your business needs
- Depends on rate of data change
(caching)



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ISSUES

- Consistency
- Data Interoperability



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- Support large scale growth with appropriate software architecture
- Minimize human interaction
- Ongoing review and improvement

SIDE BAR!

Availability options &
scalability principles
= scalable datastore



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WHAT'S NEXT

I only had
one hour!



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WHAT'S NEXT

PART 2



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WHAT'S NEXT

PART 2

- Reduce deployment time
- The right business metrics
- Team dynamics
- Managing risk
- Continual improvement
- Data interoperability
- ...



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WHAT'S NEXT

PART 2

- Reduce deployment time
- The right business metrics
- Team dynamics
- Managing risk
- Continual improvement
- Data interoperability
- ...
- Asynchronous
- Write once data
- Consistency



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CONCLUSION

- Monitoring. Before, during and after NOW.
- You may not be able to predict the future but you can preempt the future.
- Operate below 90%. That 10% is your insurance policy. Invest in insurance.



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CONCLUSION

- Does your business exist without your data?
- How long can your site be unavailable before customers go elsewhere?



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CONCLUSION

- Support 3 levels of real time data access
 - Read/Write, Read and no access
- Support 3 different aspects of scalability
 - Read, Write and Caching

REFERENCE

Presentation

- The most common MySQL scalability mistakes, and how to avoid them.



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REFERENCE

1. My website is slow?
2. I want to add new H/W. How do I change my application to support this?
3. The database is slow. My webpage takes five seconds to load.
4. Why is my database executing so many qps?
5. My server has crashed with a hard drive failure
6. My replication slave can't keep up?
7. I can't access my website?
8. Why is my database so large?
9. My website seems to freeze or responds randomly?



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