Computer Science S-75
Building Dynamic Websites

Harvard Extension School

https://www.cs75.net/

Lecture 9: Scalability

David J. Malan
malan@harvard.edu

Web Hosts

- Bluehost
- DreamHost
- Go Daddy
- Host Gator
- pair Networks
- …

VPSes

- DreamHost
- Go Daddy
- Host Gator
- Linode
- pair Networks
- Slicehost
- VPSLAND
- …

Vertical Scaling

- CPU
  - cores, L2 Cache, ...
- Disk
  - PATA, SATA, SAS, ...
  - RAID
- RAM
- . . .

Horizontal Scaling

Image from techhui.com.

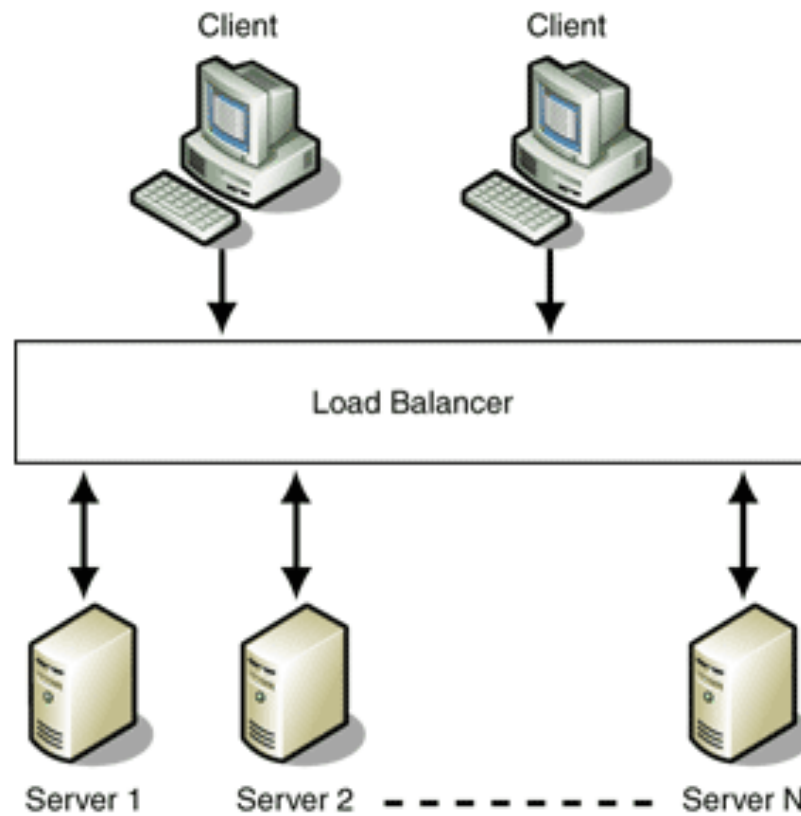# PHP Acceleration

- Code Optimization
- Opcode Caching
- . . .

PHP Accelerators

- Alternative PHP Cache (APC)
  http://pecl.php.net/package/APC

- eAccelerator
  http://eaccelerator.net/

- XCache
  http://xcache.lighttpd.net/

- Zend Platform
  http://www.zend.com/en/products/platform/

- . . .

Load Balancing

Load Balancing with BIND

```
www   IN   A   64.131.79.131

www   IN   A   64.131.79.132

www   IN   A   64.131.79.133

www   IN   A   64.131.79.134
```

Sticky Sessions

- **Shared Storage?**
  FC, iSCSI, MySQL, NFS, *etc*.
- **Cookies?**

Load Balancers

- Software
  - ☐ ELB
  - ☐ HAProxy
  - ☐ LVS
  - ☐ ...
- Hardware
  - ☐ Barracuda
  - ☐ Cisco
  - ☐ Citrix
  - ☐ F5
  - ☐ ...

Caching

- .html
- MySQL Query Cache
- memcached
- . . .

.html

MySQL Query Cache

`query_cache_type = 1`

http://dev.mysql.com/doc/refman/5.1/en/query-cache.html

memcached

```php
$memcache = memcache_connect(HOST, PORT);
$user = memcache_get($memcache, $id);
if (is_null($user))
{
    $dbh = new PDO(DSN, USER, PASS);
    $result = $dbh->query("SELECT * FROM users WHERE id=$id");
    $user = $result->fetch(PDO:FETCH_ASSOC);
    memcache_set($memcache, $user['id'], $user);
}
```
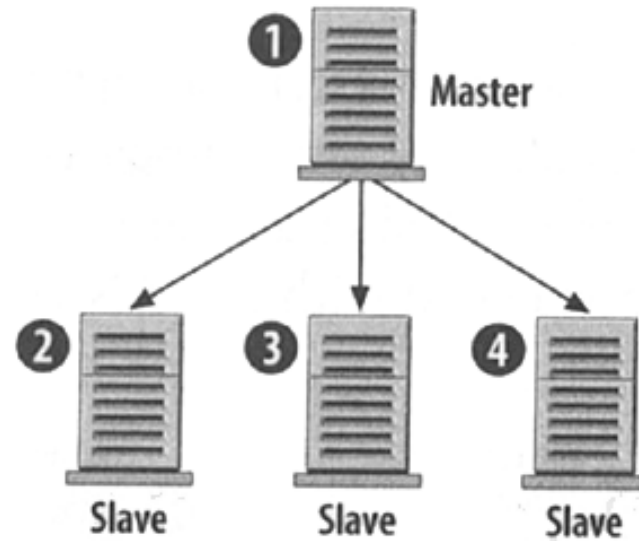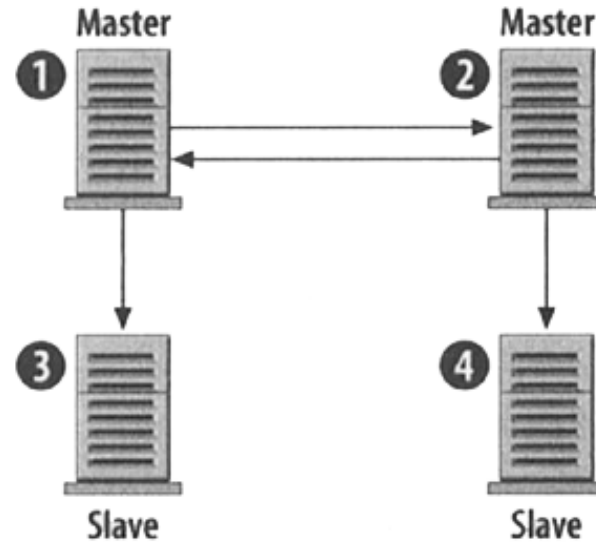
http://memcached.org/

http://www.php.net/memcache

MySQL

Feature	MyISAM	Memory	InnoDB	Archive	NDB
Storage limits	256TB	RAM	64TB	None	384EB
Transactions	No	No	Yes	No	Yes
Locking granularity	Table	Table	Row	Table	Row
MVCC	No	No	Yes	No	No
Geospatial data type support	Yes	No	Yes	Yes	Yes
Geospatial indexing support	Yes	No	No	No	No
B-tree indexes	Yes	Yes	Yes	No	Yes
Hash indexes	No	Yes	No [a]	No	Yes
Full-text search indexes	Yes	No	No	No	No
Clustered indexes	No	No	Yes	No	No
Data caches	No	N/A	Yes	No	Yes
Index caches	Yes	N/A	Yes	No	Yes
Compressed data	Yes [b]	No	Yes [c]	Yes	No
Encrypted data [d]	Yes	Yes	Yes	Yes	Yes
Cluster database support	No	No	No	No	Yes
Replication support [e]	Yes	Yes	Yes	Yes	Yes
Foreign key support	No	No	Yes	No	No
Backup / point-in-time recovery [f]	Yes	Yes	Yes	Yes	Yes
Query cache support	Yes	Yes	Yes	Yes	Yes
Update statistics for data dictionary	Yes	Yes	Yes	Yes	Yes

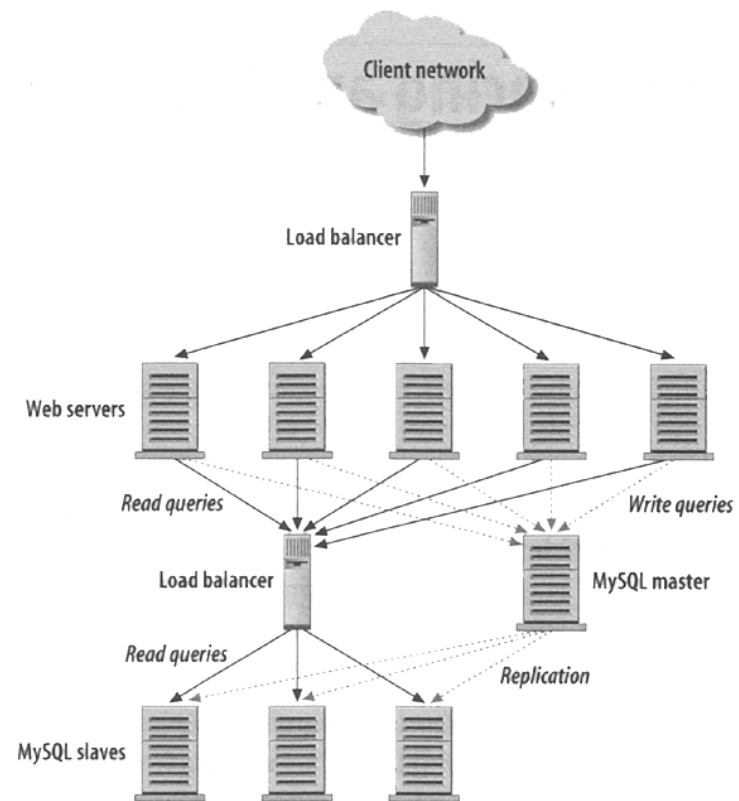http://dev.mysql.com/doc/refman/5.5/en/storage-engines.html
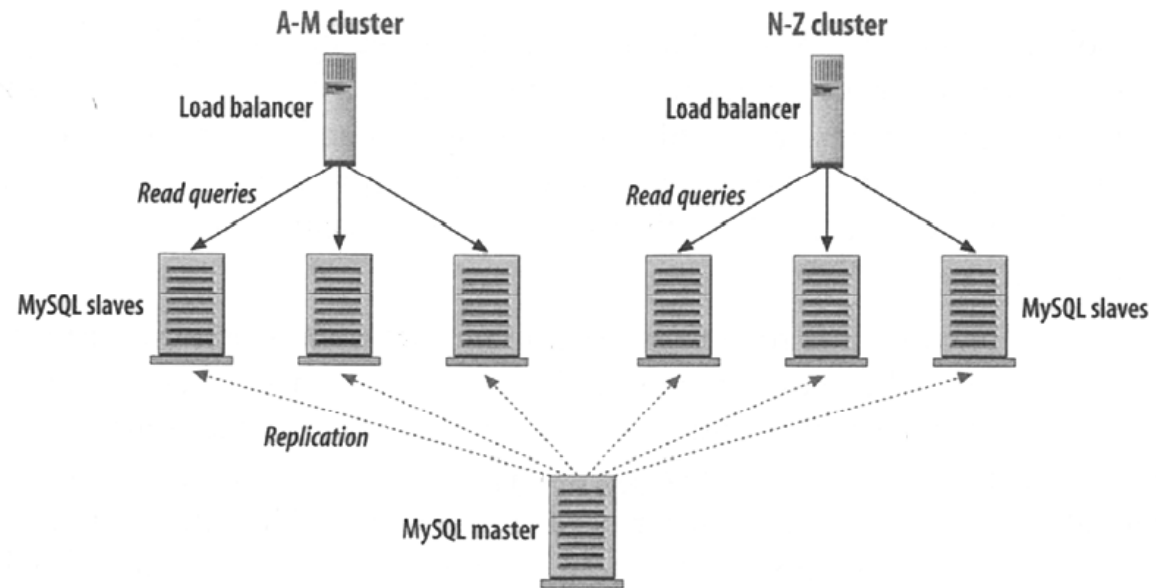
Replication: Master-Slave
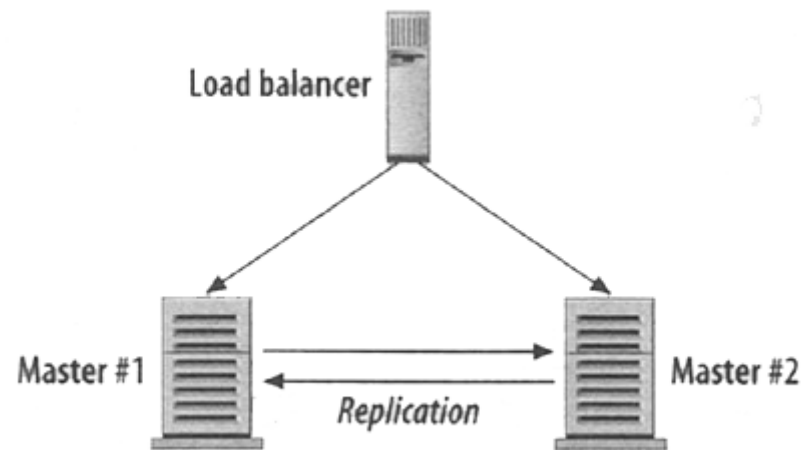
Replication: Master-Master

Load Balancing + Replication

... + Partitioning

High Availability

Computer Science S-75
Building Dynamic Websites

Harvard Extension School

https://www.cs75.net/

Lecture 9: Scalability

David J. Malan
malan@harvard.edu