Introduction to Nginx

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Agenda

- What is Nginx
- Why use Nginx
- Installing/running Nginx
- Nginx process model
- High availability
- Understanding configurations

What is Nginx

- Pronounced as “Engine X”
- Open source web and reverse proxy server
- High performance HTTP, HTTPS, SMTP, IMAP, POP3 server
- Load balancing and HTTP caching
- Asynchronous event-driven architecture

Who uses Nginx

Why use Nginx

- Lightweight with small memory footprint
- Uses predictable memory under load
- Provides high level of concurrency
- Serves static content quickly
- Handles connections asynchronously
- Uses single thread

Installing Nginx

- Add stable Nginx repository
  sudo add-apt-repository ppa:nginx/stable

- Update repositories
  sudo apt-get update

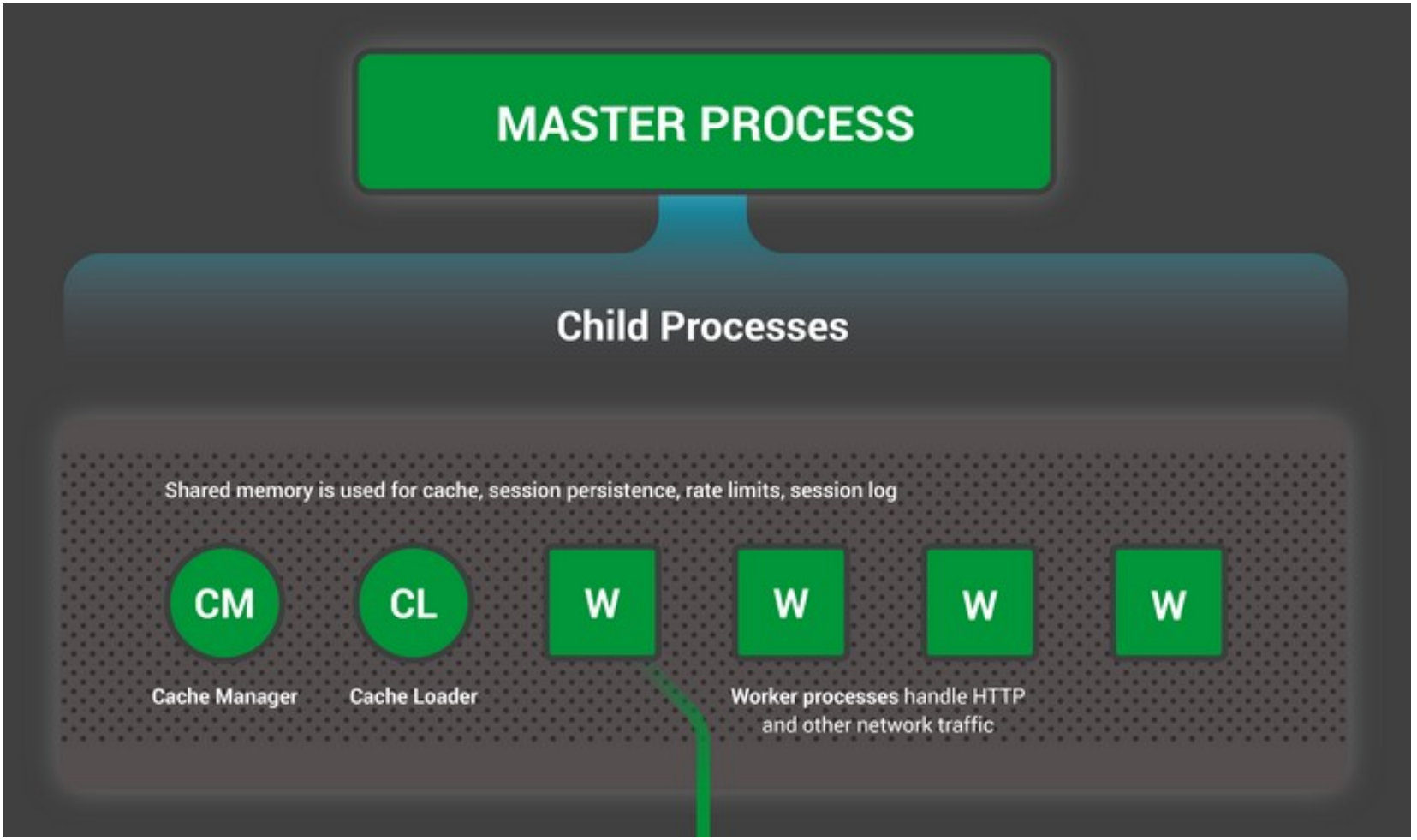
- Installing NGINX
  sudo apt-get install nginx

Starting/restarting Nginx

- Check that Nginx is running
  sudo service nginx status

- Starting, stopping and restarting Nginx
  sudo service nginx start
  sudo service nginx stop
  sudo service nginx restart

Nginx Process Model



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Master process

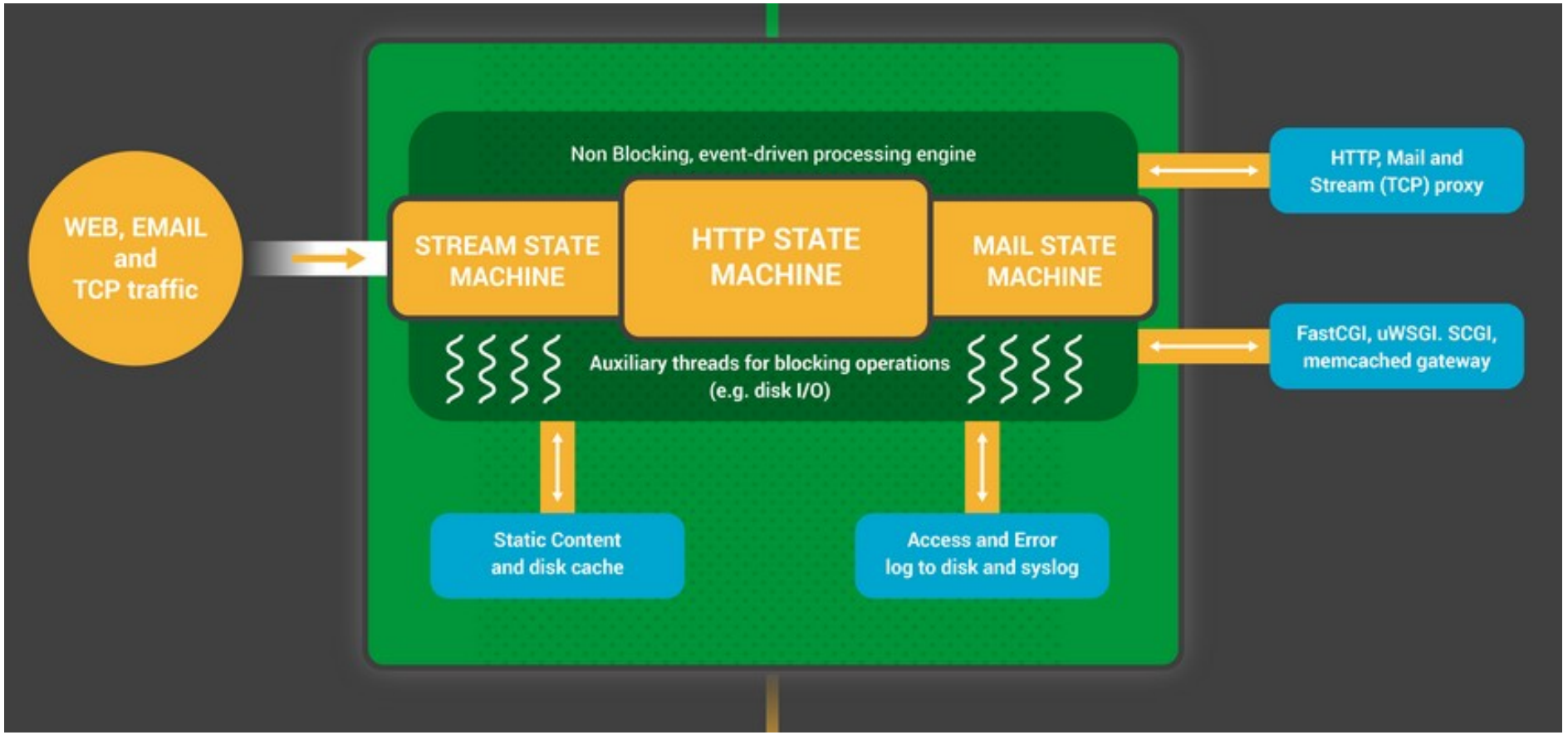
- Reads & validates configurations
- Creates and binds sockets
- Creates child processes

Cache loader → loads cache in memory

Cache manager → prunes cache periodically

Worker processes → handles connections, IO and communicate to upstream server

Child process



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Child process

- Worker is single threaded
- One worker process per CPU core

```
# directive
worker_processes auto;
```

- Communicate with each other using shared memory
- Handles multiple connections asynchronously
- Polls for events on listen & connection sockets

Child process

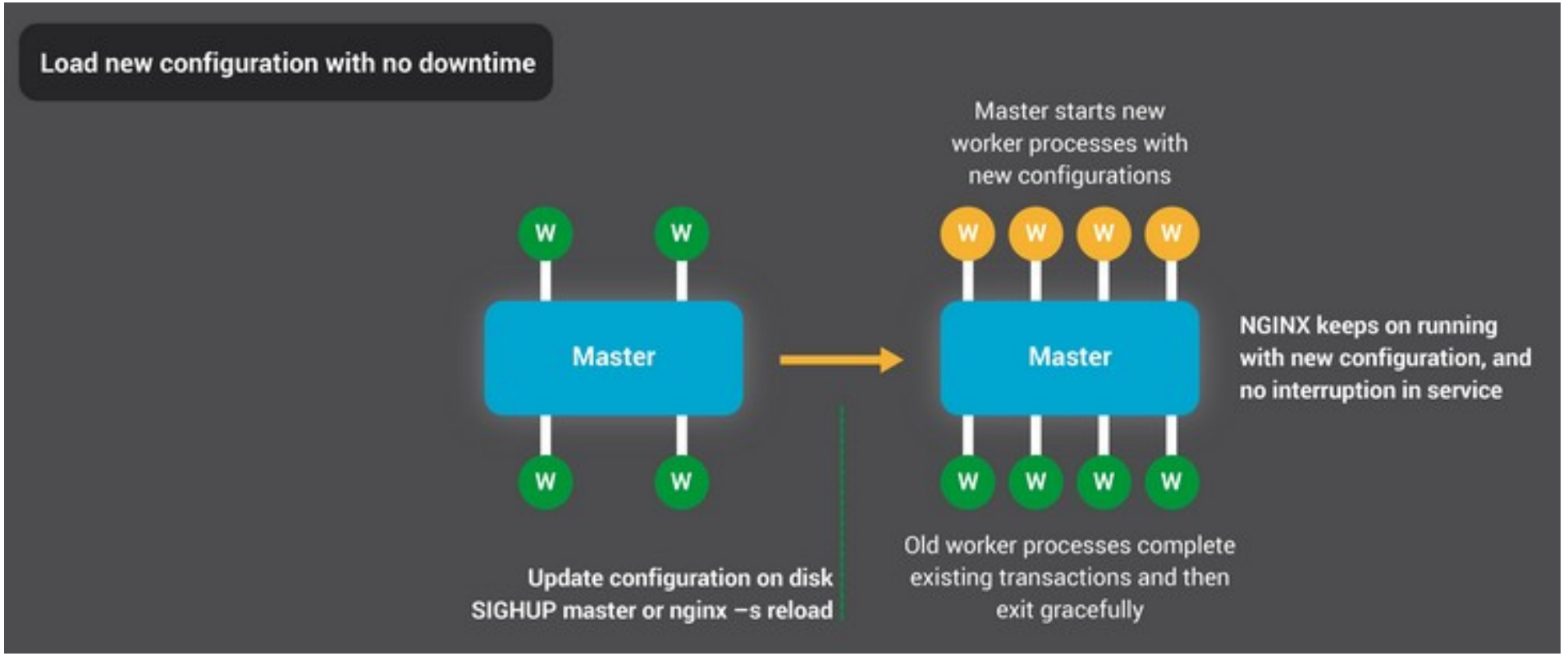
- Events on listen sockets start a new connection
- Events on connection socket handles subsequent requests
- Connections are submitted to state machine

  HTTP

  Stream

  Mail (SMTP, IMAP and POP3)

High availability



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High availability

- As simple as doing

  nginx -s reload
  -s sends signal to master process

- A small CPU spike

Nginx conf

main context

```
user sid;
worker_processes auto;
pid /run/nginx.pid;

events {
        worker_connections 4096;
}

http {
        # Change this depending on environment
        upstream api {
                server localhost:9000;
        }

        # Basic Settings
        sendfile on;
        tcp_nopush on;
        tcp_nodelay on;
        keepalive_timeout 65;
        types_hash_max_size 2048;

        include /etc/nginx/mime.types;
        default_type application/octet-stream;

        # Logging Settings
        access_log /var/log/nginx/access.log;
        error_log /var/log/nginx/error.log;

        # Virtual Host Configs
        include /etc/nginx/conf.d/*.conf;
        include /etc/nginx/sites-enabled/*;
}
```

events context

http context

server context
(nested context)

Server configurations

```
server {
        listen   localhost:80;
        server_name hellonginx.com;

        root /home/sid/workspace/hello-nginx;
        index index.html;
        include /etc/nginx/mime.types;

        # /api will serve your proxied API that is running on same machine different port
        # or another machine.
        location /api/ {
                proxy_pass http://api/;
                proxy_http_version 1.1;
                proxy_set_header Upgrade $http_upgrade;
                proxy_set_header Connection 'upgrade';
                proxy_set_header Host $host;
                proxy_cache_bypass $http_upgrade;
                proxy_set_header X-Real-IP $remote_addr;
                proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
        }
}
```

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References

- https://www.nginx.com/blog/inside-nginx-how-we-designed-for-performance-scale/
- https://t37.net/nginx-optimization-understanding-sendfile-tcp_nodelay-and-tcp_nopush.html

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Thank You