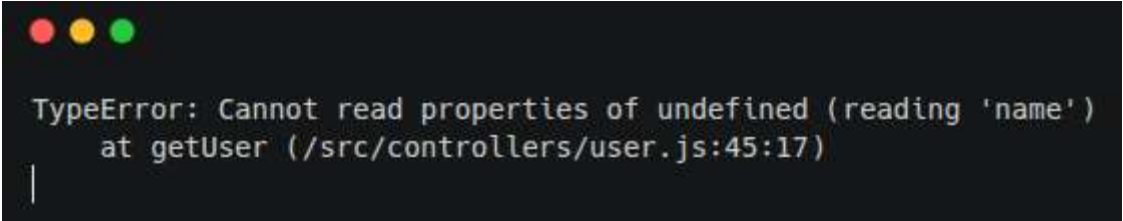


Difference Between Development, Test, Staging & Production Environments

Development Environment

- Used by developers to write, debug, and build code
- Frequent code changes; unstable but flexible
- Contains mock data or local databases
- Tools: IDEs, debuggers, version control branches

Errors in Development environment

A terminal window with a dark background and three colored window control buttons (red, yellow, green) in the top-left corner. It displays a JavaScript error message in a light-colored monospace font.

```
TypeError: Cannot read properties of undefined (reading 'name')  
    at getUser (/src/controllers/user.js:45:17)  
|
```

Errors in Development environment



```
{  
  "status": 500,  
  "message": "Database connection failed"  
}
```

Testing Tools Used in Development Environment

- **Unit Testing Frameworks**
 - JavaScript / TypeScript - Jest
 - Python - PyTest
 - Java - JUnit
- **API Testing Tools**
 - Postman
 - Swagger
- **Static Code Analysis Tools**
 - ESLint (JS/TS)
 - TS Error Checker (TypeScript Compiler)
 - Pylint (Python)

Testing Tools Used in Development Environment

- **Build & CI Tools**
 - Jenkins
 - GitHub Actions
- **Debugging**
 - IDE

Test Environment

- Used by QA/Testers to validate functionality
- Contains controlled test data
- Runs automated/manual tests
- More stable than Dev but still isolated
- QA engineers perform functional, integration, performance, and security testing.
- Errors are shown for debugging purpose.

Test Environment tools

- **Functional Testing Tools**

- E.g., selenium
- Test end-to-end features.

- **API Testing Tools**

- QA uses these for validating backend services.
- e.g., Postman

- **Performance Testing Tools**

- To measure speed, load, scalability, and stress behavior.
- e.g., JMeter

- **Bug Tracking Tools**

- logging, tracking, assigning, and verifying bugs.
- Jira

Staging Environment

- Replica of production environment
- Used for final verification before deployment
- Realistic data & configuration settings
- Used for UAT, performance tests, release testing

Staging Environment Errors


- Sensitive internal details are hidden
- Errors are stored in monitoring tools instead of printed on screen

Staging Environment Errors

- **Hide sensitive information (Dev vs Staging)**



```
TypeError: Cannot read properties of undefined (reading 'name')  
    at getUser (/src/controllers/user.js:45:17)  
|
```



```
{  
  "statusCode": 500,  
  "message": "Internal server error",  
  "error": "Server Error"  
}
```

Staging Environment Errors

- Log errors in the server.



```
catch(exception)
{
  console.log("Error:", exception)
}
```

Testing Tools in Staging Env

- Performance & Load Testing Tools
 - Used to validate system behavior under almost real traffic before deployment.
 - Ensure staging can handle production-level load.
 - JMeter
- Integration & End-to-End Testing Tools
 - Selenium
- API Contract Testing Tools
 - Check if the backend and frontend meet agreed API contracts before production.
 - Postman (automated collections)

Production Environment

- Live environment used by real end users
- High stability, uptime, and performance required
- Contains real customer data
- Errors here impact business and users directly
- Tested by end users or selected group of users(before release)

Production Environment Errors

- User-Friendly Error Message (NO technical details)
- This prevents leaking:
 - Stack traces
 - File names
 - Server/internal logic
 - Sensitive data


Production Environment Errors

Bad gateway


Error code 502

Visit cloudflare.com for more information.


2024-01-21 03:40:09 UTC



You
Browser
Working



Amsterdam
Cloudflare
Working



[REDACTED]
Host
Error

What happened?

The web server reported a bad gateway error.

What can I do?

Please try again in a few minutes.

Production Environment Errors

Dev

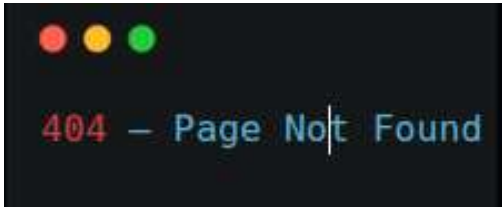
- Detailed error message with stack trace
- Contains route name, file, line number



```
GET /api/user/ 404 5.23 ms - Route not found
```

Production

- Clean 404 page, no technical info
- Log errors internally on the server.



```
404 - Page Not Found
```

Production Environment Testing tools

- Production uses monitoring, observability, on-device testing, synthetic checks, and error tracking tools
- AWS CloudWatch
- Azure Monitor

Production Environment Testing tools

E.g., the htop command-line tool for physical server monitoring

```
~project$htop
  1  [|||||] 34.3% Aug
  2  [|||||] 25.0%
  3  [|||||] 13.0%
  4  [|||||] 12.0%
Mem [|||||] 1.16G/7.01G Tasks: 55, 165 thr: 3 running
Swap [|||||] 0K/0M Load average: 0.64 0.38 0.29
                                           Uptime: 05:19:59
                                           Battery: 35.5% (Running on A/C)

PID USER   PRI  D1  VIRT  RES  SHR  S  CPU%  MEM%  TIME+ Command
5177 hishan 20  0 35820 5000 4592 S  0.0  0.1  0:00.00 gna
5176 hishan 20  0 2952 2000 1976 S  0.0  0.0  0:00.05 /bin/dbus-daemon --config-file=/System/Settings/at-spi2/ac
5175 hishan 20  0 35820 5000 4592 S  0.0  0.1  0:00.00 gdbus
5169 root    20  0 34456 6224 5236 S  0.0  0.1  0:02.90 /usr/lib/upower/upowerd
5170 root    20  0 34456 6224 5236 S  0.0  0.1  0:00.00 gdbus
5169 root    20  0 34456 6224 5236 S  0.0  0.1  0:00.00 gna
5165 hishan 20  0 177M 12896 6764 S  0.0  0.2  0:47.25 /usr/bin/pulseaudio --start --log-target=syslog
5309 hishan 20  0 177M 12896 6764 S  0.0  0.2  0:00.00 |
5308 hishan 20  0 177M 12896 6764 S  0.0  0.2  0:00.00 |
5100 hishan 20  0 177M 12896 6764 S  0.0  0.2  0:00.01 |
5174 hishan 20  0 177M 12896 6764 S  0.0  0.2  0:45.67 |
5168 hishan 20  0 32208 11616 10624 S  0.7  0.1  0:00.67 xfsettingsd
5167 hishan 20  0 32208 11616 10624 S  0.0  0.1  0:00.53 |
5159 hishan 20  0 35076 17196 14320 S  0.0  0.2  0:01.17 xfce4-power-manager
5161 hishan 20  0 35076 17196 14320 S  0.0  0.2  0:00.00 |
5150 hishan 20  0 64340 31912 22020 S  0.0  0.4  0:00.60 nm-applet
5207 hishan 20  0 64340 31912 22020 S  0.0  0.4  0:00.00 |
5146 hishan 20  0 46952 22540 16712 S  0.0  0.3  0:01.52 xfdesktop
5211 hishan 20  0 46952 22540 16712 S  0.0  0.3  0:00.53 |
5144 hishan 20  0 33156 13072 12216 S  0.0  0.2  0:00.02 Thunar --daemon
5153 hishan 20  0 33156 13072 12216 S  0.0  0.2  0:00.00 |
5142 hishan 20  0 39672 21724 17000 S  0.0  0.3  0:04.26 xfce4-panel
19006 hishan 20  0 18308 8600 7012 S  0.0  0.1  0:00.14 |
19007 hishan 20  0 0700 5008 3700 S  0.0  0.1  0:00.09 |
Help F2Setup F3Search F4Filter F5Sorted F6Collapse F7Nice F8Nice F9Exit F10Quit
```

Overview

- Development → Frequently changing, unstable, developer-centric
- Testing → Stable for test cycles, tester-centric
- Staging → Near-production, pre-release validation
- Production → Stable, secure, real users & data