🔥 Cloudflare Outage 2025

How One File Took Down 16% of the Internet

Geeks Club

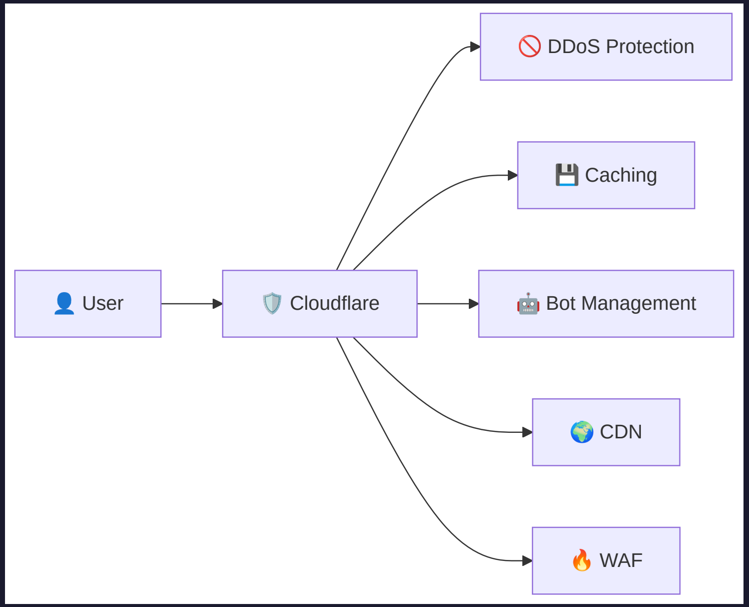
📆 December 10, 2025

📋 Agenda

1. 🌐 **Why is Cloudflare important?**
2. 💥 **What happened?** - Outage Timeline
3. 🔧 **Technical Analysis** - ClickHouse, Rust, unwrap()
4. 🎭 **Confusing Factors** - Why they thought it was a DDoS attack
5. 📝 **Conclusions and Remedial Actions**
6. 💭 **Comment** - What do we learn from this?

🌐 What is Cloudflare?

Middleware between the client and your application



📊 Cloudflare Scale

~16% of all internet traffic 🌍

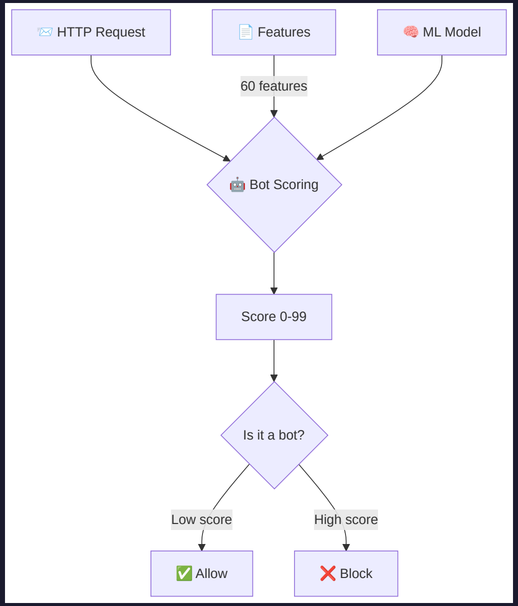
> Every sixth request on the internet goes through Cloudflare

Known users:

Category	Companies
🏢 Technology	Mozilla, Microsoft Azure, Office 365, IBM
🛒 E-commerce	Nike, H&M, Shopify
💬 Social	Reddit, Twitter

🤖 Bot Management - Source of the Problem

How does bot scoring work?



Bot Score: 0-99 (higher = greater bot probability)

🗃️ ClickHouse Architecture

Databases and shards

```
flowchart LR
    subgraph ClickHouse Architecture
        S1[Shard 1] --> R0[Database 'R0'<br/>(physical data)]
        S2[Shard 2] --> R0
        SN[Shard N] --> R0
        R0 --> Default[Database 'default'<br/>(aggregated view)]
        Default --> Q[SQL Query]
    end
```

🔍 Query without database discriminator

```sql
SELECT
  name,
  type
FROM system.columns
WHERE
  table = 'http_requests_features'
ORDER BY name;
```

⚠️ **Problem:**

- No `WHERE database = 'default'`
- After permission change → both databases visible
- **60 features × 2 = 120+** features

🦀 Rust and fatal `unwrap()`

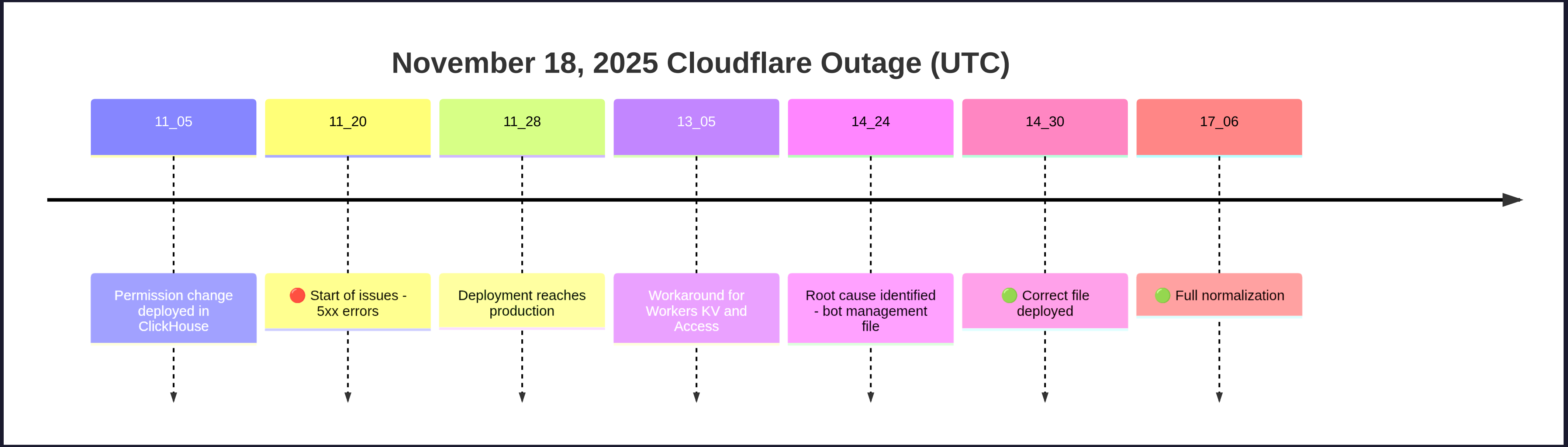
```rust
// Simplified code that caused panic
fn load_features(config: &Config) -> Features {
    let features = append_with_names(&config)
        .unwrap();  // 💥 BOOM!

    features
}
```

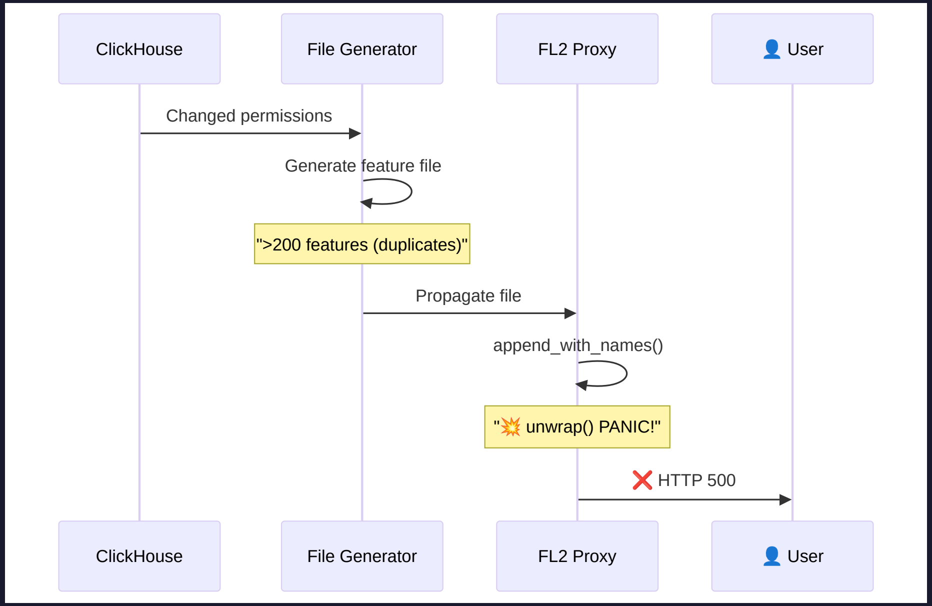
Memory preallocation problem:

- **Limit:** 200 features (safety buffer)
- **Expected:** ~60 features
- **Received:** >200 features (duplicates)
- **Result:** `Result::unwrap()` on `Err` → **PANIC** 💀

⏰ Outage Timeline

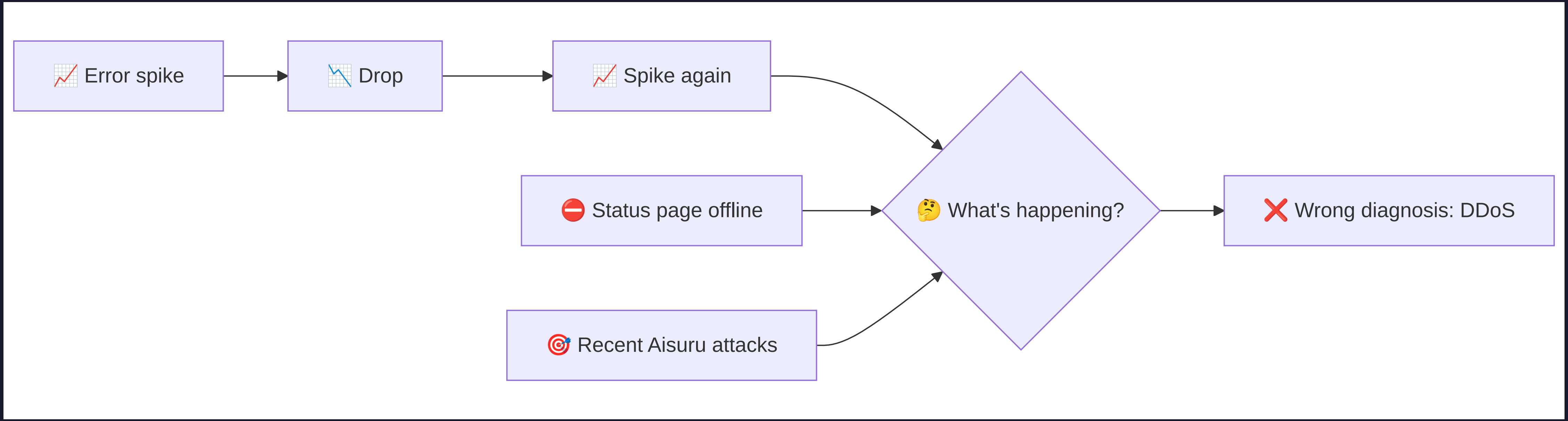

November 18, 2025 Cloudflare Outage (UTC)
11_05
Permission change deployed in ClickHouse
11_20
🔴 Start of issues - 5xx errors
11_28
Deployment reaches production
13_05
Workaround for Workers KV and Access
14_24
Root cause identified - bot management file
14_30
🟢 Correct file deployed
17_06
🟢 Full normalization

💥 Outage Mechanism



🎭 Confusing Factors

Why did they think it was a DDoS attack?



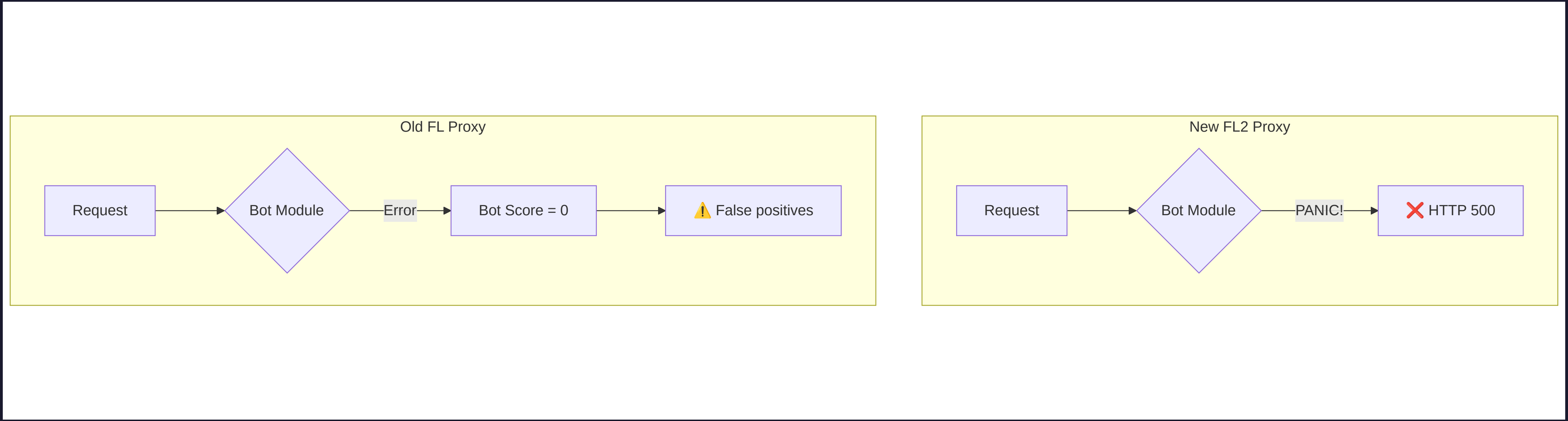
Unusual behavior:

- Fluctuations: old nodes had correct cache
- Status page (independent infra) also offline → **coincidence!**

📊 Impact on Services

Service	Impact
🌐 **CDN / Security**	HTTP 5xx for all clients
🔐 **Turnstile**	Complete failure
📦 **Workers KV**	Increased error rate
📊 **Dashboard**	Unable to log in
🔑 **Access**	Authentication errors
📧 **Email Security**	Reduced spam detection

🔧 FL vs FL2 - Different Impact



FL2: Hard 500 errors

FL: Everything = "not-bot" → blocking rule issues

📝 Cloudflare Remedial Actions

Official list:

1. 🔒 **Hardening** of internal configuration (like user data)
2. 🔘 **Kill-switches** - global function switches
3. 💾 **Core dumps** - cannot overload the system
4. 🔍 **Review failure modes** of all proxy modules

> *"Today's outage was the most serious incident since 2019"*
> — Matthew Prince, CEO

💡 Our Technical Conclusions

What could have been done better?

```
let features = append_with_names(&config).unwrap_or_default();
if features.len() > 200 {
    log::warn!("Retrieved {} features, exceeded limit 200. Taking first 200.", features.len());
    features.truncate(200);
}
// ✅ Continue with features
```

Instead of:

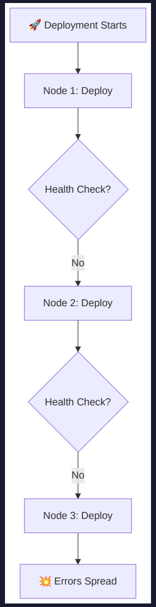
```
.unwrap()  // ❌ PANIC!
```

Should be:

```
.unwrap_or_else(|e| { log::error!("{}", e); defaults() })
```

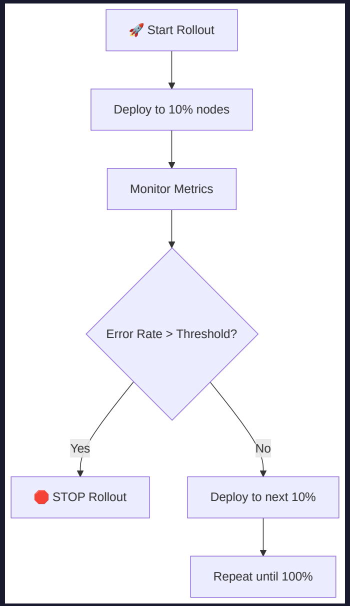
Preventing Deployment Spread: Circuit Breakers and Rollout Strategies

Why did the update keep spreading?



Automated rollouts without real-time monitoring → Errors propagate unchecked

Circuit Breaker Pattern for Deployments



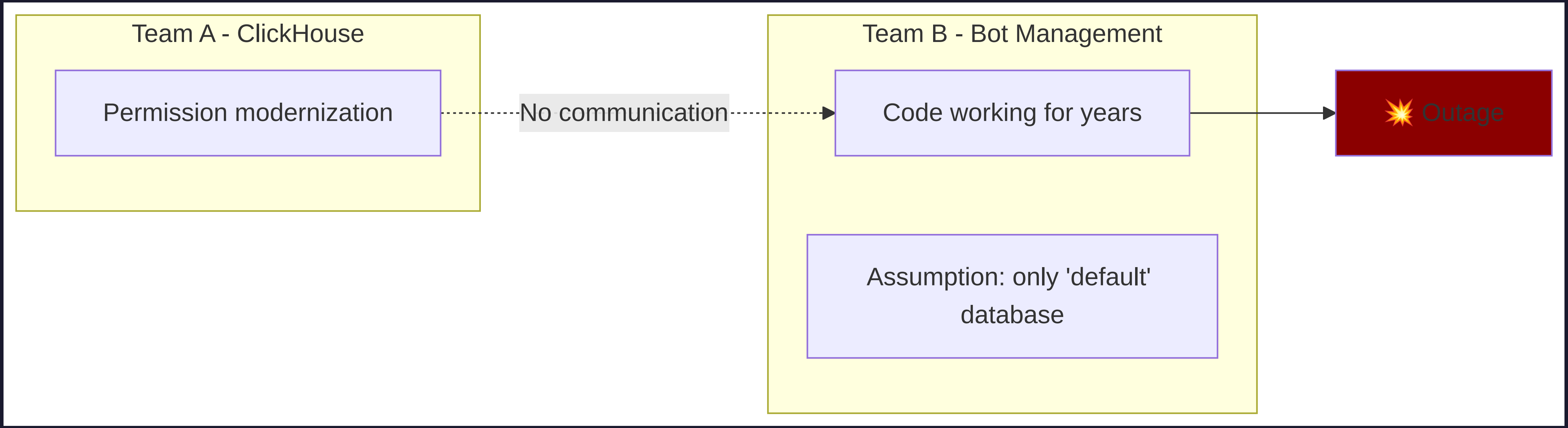
Stop propagation if errors exceed safe limits

Different Strategies for Different Changes

Change Type	Strategy	Speed vs Safety
🔒 **Security Patches**	Fast rollout	⚡ Speed (counter attacks)
🏗️ **Infrastructure Changes**	Canary / Blue-Green	🛡️ Safety (rollback ready)

Balance speed for security with caution for infra

🏢 Organizational Problem

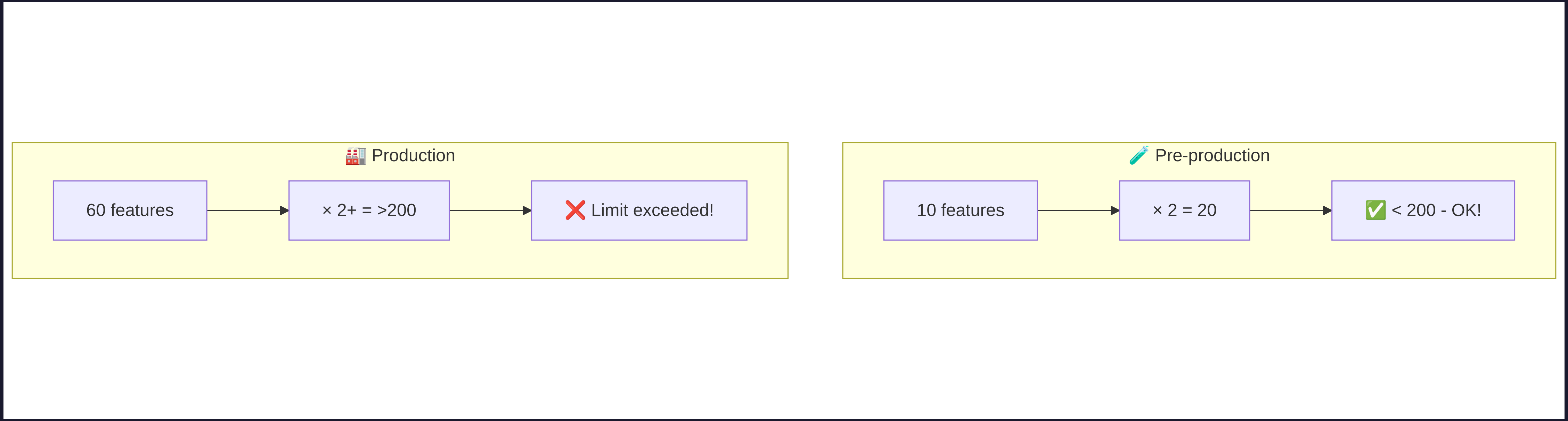


🎯 **Key problem:**

Change in one place → explosion in another

🧪 What about the test environment?

Possible explanation:



Production scale ≠ Test scale

🔥 Key Lessons

1️⃣ **Defensive Programming**

> Never trust that inputs will be correct

2️⃣ **Graceful Degradation**

> System should work limited, not crash

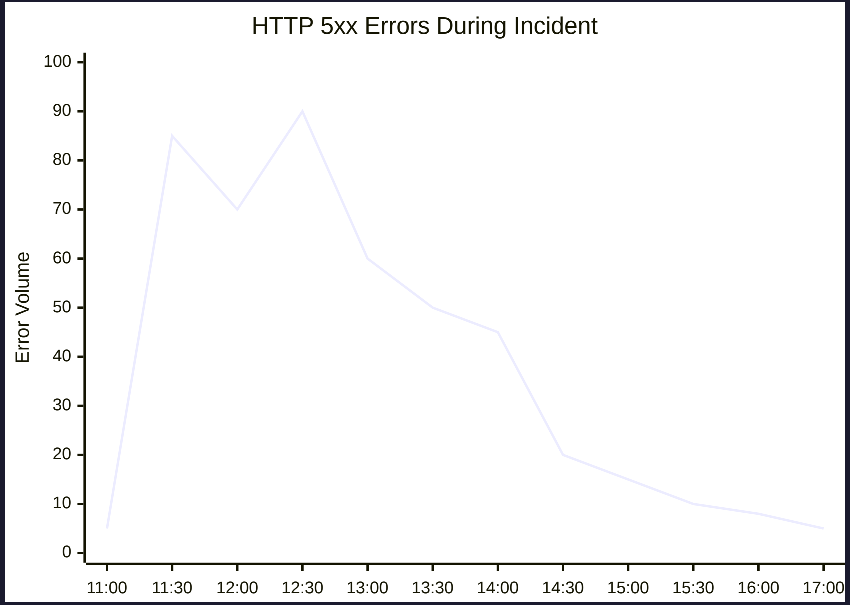
3️⃣ **Inter-team Communication**

> Changes in one system can affect others

4️⃣ **Production-scale Testing**

> Pre-prod must reflect reality

📈 Outage Visualization



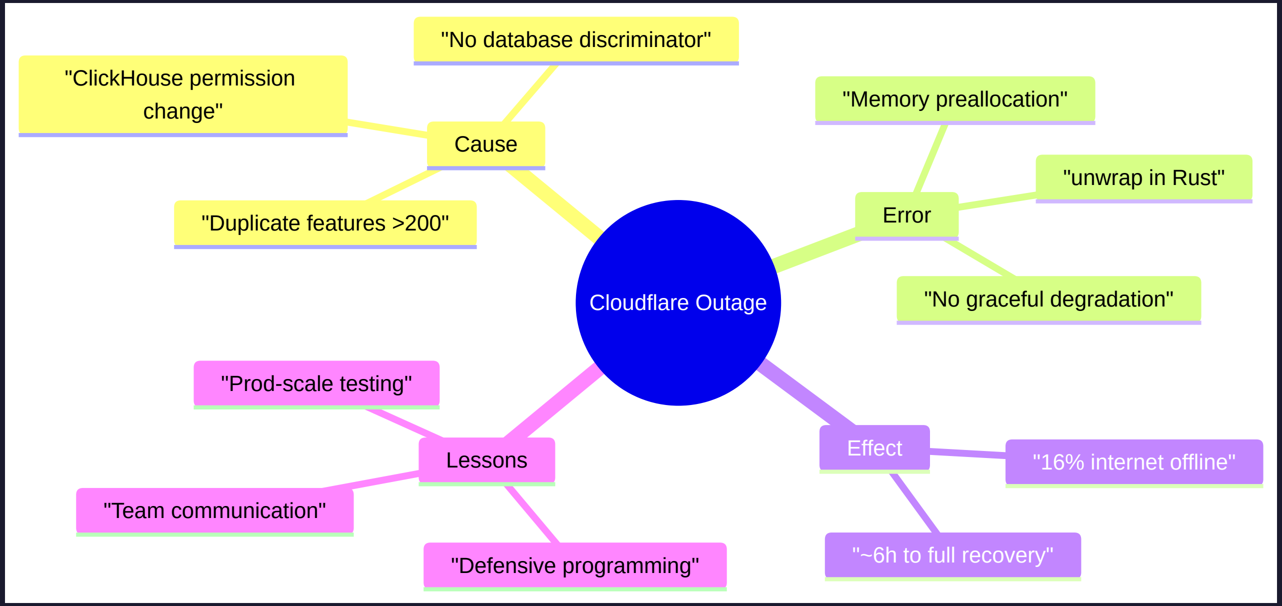
Fluctuations = different nodes with different feature file versions

🤔 For Discussion

Questions for the team:

1. 🔍 **Do we have similar "hidden dependencies"** in our systems?
2. 🦀 **How do we handle errors** in critical code paths?
3. 📊 **Do our test environments** reflect production scale?
4. 🔔 **How quickly will we detect** an outage before users?
5. 📝 **Do we do post-mortems** and are they public?

🎯 Summary


Cloudflare Outage
Cause
"ClickHouse permission change"
"No database discriminator"
"Duplicate features >200"
Error
"Memory preallocation"
"unwrap in Rust"
"No graceful degradation"
Effect
"16% internet offline"
"~6h to full recovery"
Lessons
"Prod-scale testing"
"Team communication"
"Defensive programming"

📚 Sources

Official Post-Mortem:

🔗 blog.cloudflare.com/18-november-2025-outage

Video:

🎬 IT News #25 - DevMentors

🙏 Thank You!

Questions?

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         🛡️ Post-Mortem 18.11.2025 🛡️
```

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