



# OVERVIEW

- Intro & History
  - Hot Features
  - Behind the Scenes
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# ABOUT ME

- Decade of making console games
  - Writing C++ tools
  - Google, YouTube mobile
  - Finance
-

# ABOUT ME

- Decade of making console games
  - Writing C++ tools
  - Google, YouTube mobile
  - Finance
  - But then...
-



# COMPILER EXPLORER



# ORIGIN STORY

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# ORIGIN STORY

```
watch "g++ /tmp/test.cc -std=c++0x -O2 -c -S -o - -masm=intel \
| c++filt \
| grep -vE '\s+\.'"
```



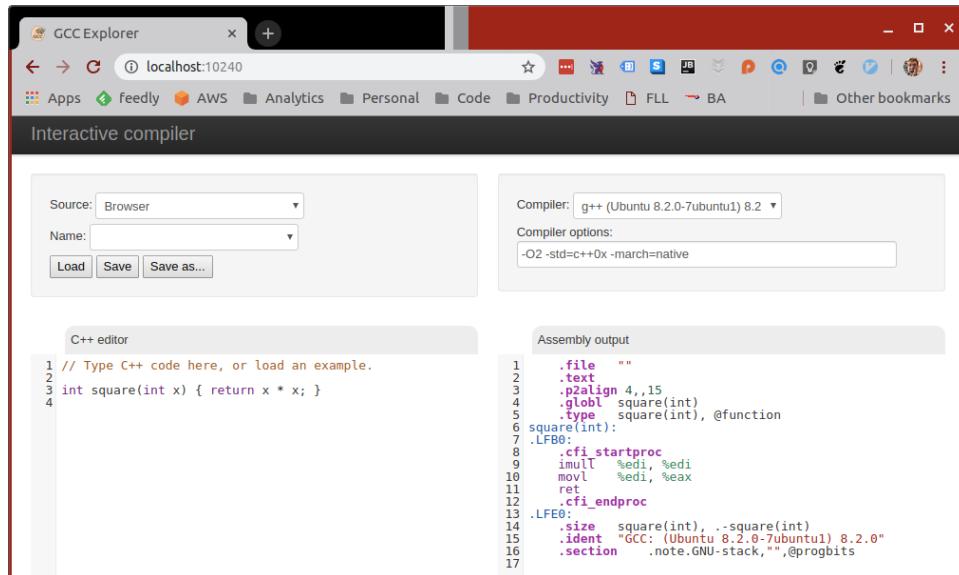
# ORIGIN STORY

- Great
  - But not pretty
-

# ORIGIN STORY

- Great
  - But not pretty
  - TO THE WEB!
-

# GCC EXPLORER!



## EVOLUTION: 2012-2014

- Colouration & filtering
  - More compilers
  - D language support
  - Rust support
  - goo.gl short links
-

# EVOLUTION: 2015-2017

- Binary support
  - GoldenLayout
  - Monaco
  - Libraries
-

# EVOLUTION: 2018

- Unified languages
  - MS compilers
  - Tools windows
-

# EVOLUTION: 2019

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# EVOLUTION: 2019

- 6502 support!
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# EVOLUTION: 2019

- 6502 support!
  - Code execution!
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## HOT FEATURES

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# EXECUTION SUPPORT

[Link](#)

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# UNIFIED LANGUAGES

[Link](#)

[Link](#)

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# CONTROL FLOW GRAPH

```
int countSetBits(unsigned value)
{
    int count = 0;
    while (value != 0)
    {
        count++;
        // clear bottom set bit
        value &= (value - 1);
    }
    return count;
}
```

[Link](#)

# LLVM-MCA TOOL

```
int sumOverArray(const int *input, unsigned length) {
    int sum = 0;

    for (unsigned index = 0; index < length; ++index)
        sum += input[index];

    return sum;
}
```

# CONFORMANCE VIEW

```
#include <filesystem>
namespace fs = std::filesystem;

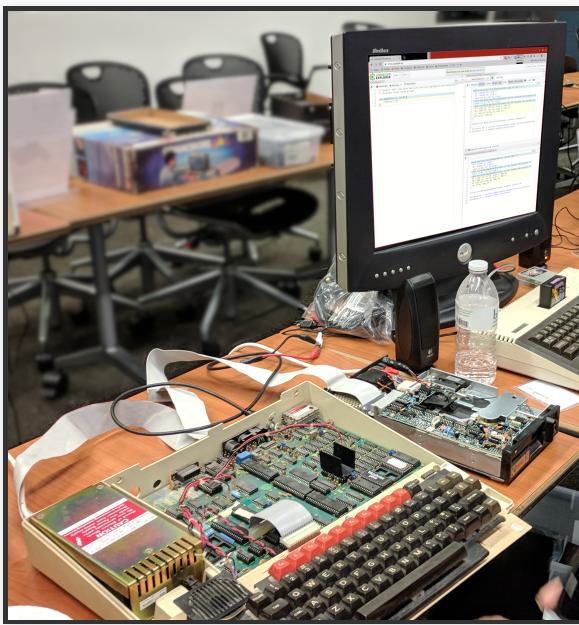
bool exists(const fs::path &filePath) {
    return fs::exists(filePath);
}
```

## BUT WAIT THERE'S MORE:

- `#include <https://...>`
  - Tools
    - clang-tidy, clang-query
    - pahole
    - readelf
    - x86-to-6502
  - Views
    - GCC RTL/tree
    - Clang IR/parse tree
-

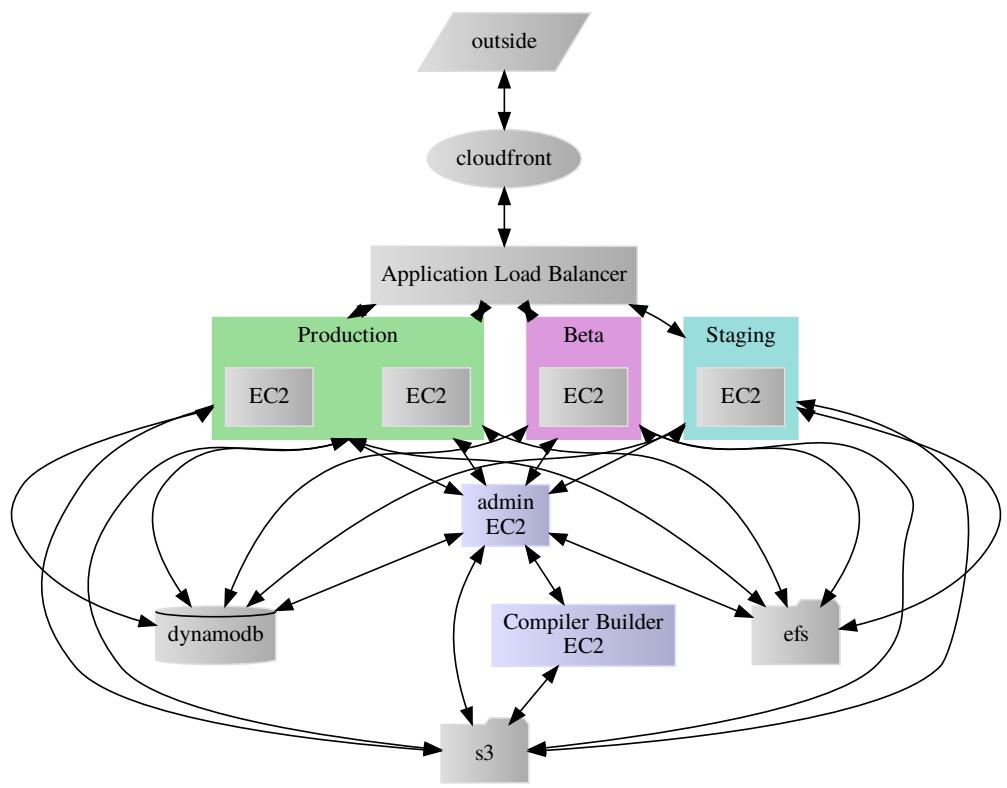
# BEHIND THE SCENES

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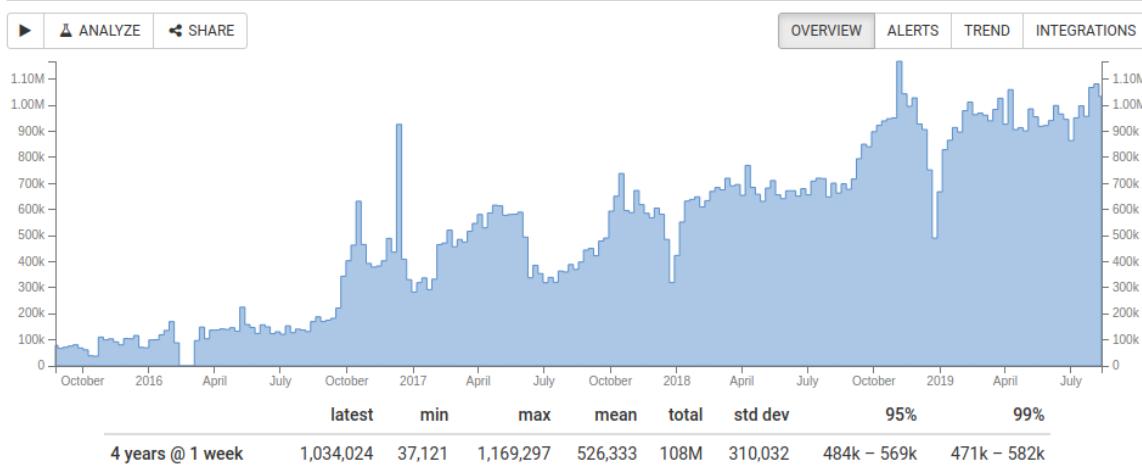
# MORE BORINGLY...

- node.js
- Amazon Web Services
- CloudFront / Load Balancers
- 3-5 EC2 instances
- EFS / S3 / DynamoDb



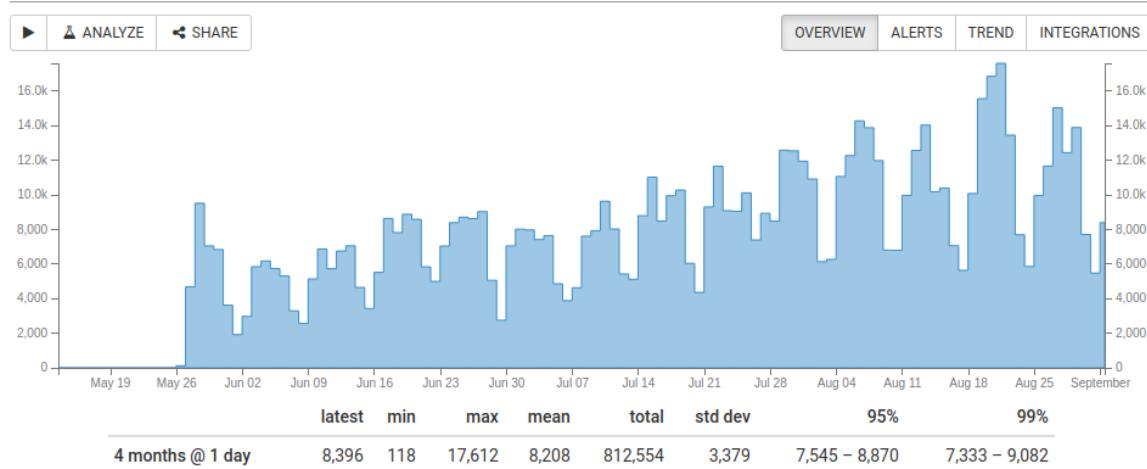
# CE STATS

## All Compilations



# CE STATS

## Sandbox Executions



# CE STATS

- 1,000,000 compiles per week
- 1.5/sec average
- 4/sec peak
- 80,000 executions per week
- 3000 short URLs per week

# COMPILER STATS

- 400+ compilers
- 250+ GB

Ada   Analysis   Assembly   C   C++   Clean   Cppx  
CUDA   D   Fortran   Go   Haskell   ispc   LLVM IR  
OCaml   Pascal   Rust   Swift   Zig

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# MAINTAINING

```
admin-node ~> ce --env prod instances list
Address      State       Type        ELB      Service  Version
34.226.244.207  running    t3.medium  healthy  running  3965 (master)
3.91.14.221    running    c5.large   healthy  running  3965 (master)

admin-node ~> ce --env prod builds list
Live  Branch      Version     Size      Hash
--> master      3965       58.2MiB   969925..8b69c5
      master      3979       58.2MiB   9410c2..fbc044
      policy-...  3983       58.2MiB   27eccb..62da61

admin-node ~> ce --env prod builds set_current 3979
admin-node ~> ce --env prod instances restart
```

# COMPILERS

- Built with custom docker containers
- Daily process
- [World's worst CI](#)
- Takes 4+hr/day on fast machine (c5d.4xlarge)

# SECURITY

- Compilers
- User execution
- [firejail](#)
- [nsjail](#)

# MONITORING

- [papertrail](#) - live event monitoring
- [AWS Dashboard](#)
- [stathat](#) - aggregate statistics
- [Google Analytics](#)
- [sentry](#) - javascript error aggregation
- [StatusCake](#) - uptime monitoring

# WHEN THINGS GO WRONG

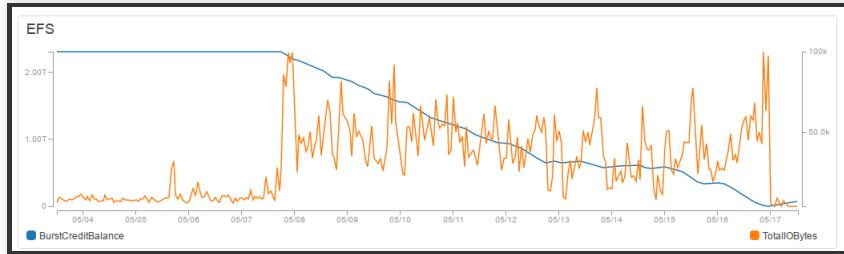
STATUS PERIODS			
Status	From	Until	Span
Up	2018-11-10 05:12:50	2019-03-26 01:13:54	Ongoing (4 months)
Down	2018-11-10 05:10:00	2018-11-10 05:12:50	2 Minutes
Up	2018-08-15 11:36:10	2018-11-10 05:10:00	86 Days 17 Hours
Down	2018-08-15 03:16:55	2018-08-15 11:36:10	8 Hours 19 Minutes
Up	2018-06-22 07:05:39	2018-08-15 03:16:55	53 Days 20 Hours
Down	2018-06-22 07:00:30	2018-06-22 07:05:39	5 Minutes
Up	2018-04-24 11:58:12	2018-06-22 07:00:30	58 Days 19 Hours
Down	2018-04-24 11:36:48	2018-04-24 11:58:12	21 Minutes
Up	2017-05-17 04:09:03	2018-04-24 11:36:48	342 Days 7 Hours
Down	2017-05-17 03:03:05	2017-05-17 04:09:03	1 Hours 5 Minutes
Up	2017-01-23 02:46:14	2017-05-17 03:03:05	114 Days 0 Hours

## WHEN THINGS GO WRONG

- Bad config (August 2018)

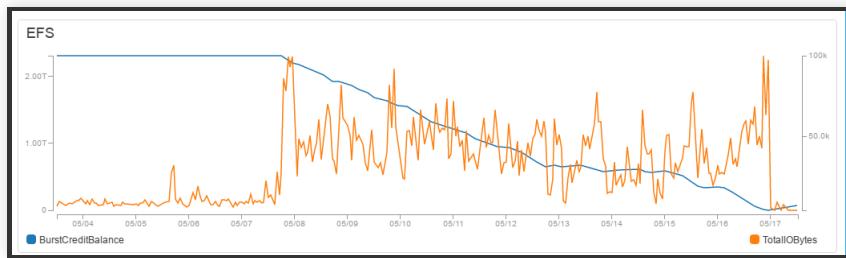
# WHEN THINGS GO WRONG

- Bad config (August 2018)
- EFS transfer limit (May 2017)



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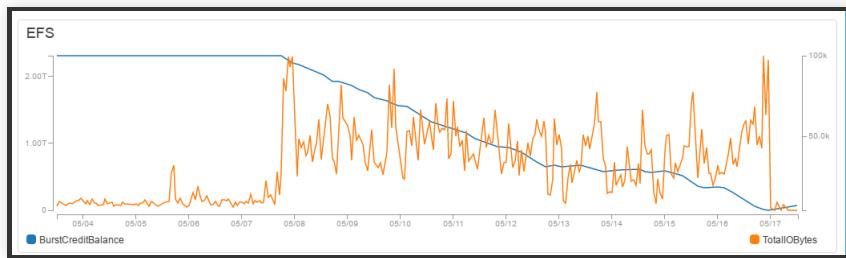
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- S3 outage (Feb 2017)

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- Bad config (August 2018)
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- S3 outage (Feb 2017)
- EFS/NFS/bind mount/systemd catastrophe (September 2019)

# THE FUTURE

- Improve execution
  - Bug fixing
-

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- Improve execution
- Bug fixing
- 2020 goal: decent small-screen support

# CONCLUSION

- Learned so much
- Doors opened
- C++ community is amazing
  - Thank you Rubén, Partouf, Austin, Chedy, Jared...

# THANK YOU!

- [Main Github repo](#)
- [Image Github repo](#)
- [Patreon](#)

What questions do you have?

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