

# `./clang-talk`



# Table of Members

```
class Talk {  
    public:
```

```
};
```

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```
class Talk {  
    public:  
  
    llvm::LLVM CompilerToolchain;  
  
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class Talk {  
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    llvm::LLVM CompilerToolchain;  
  
    clang::Clang Frontend;  
  
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    public:  
  
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    clang::Tooling Tooling;  
  
    clang::Tooling YourTool;  
};
```

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class Talk {  
    public:  
  
    llvm::LLVM CompilerToolchain;  
  
    clang::Clang Frontend;  
  
    clang::Tooling Tooling;  
  
    std::vector<clang::Tooling> YourTools;  
  
};
```

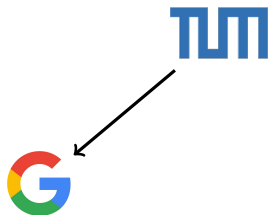
# Background



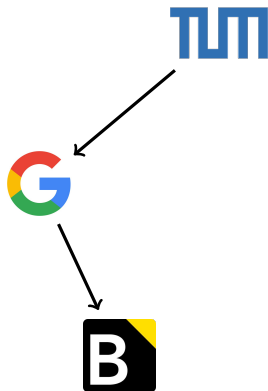
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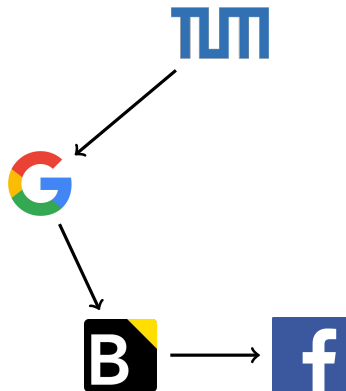
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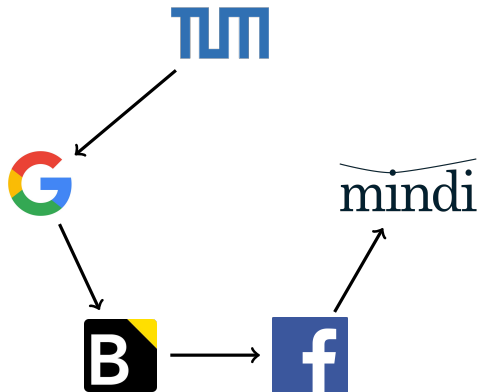
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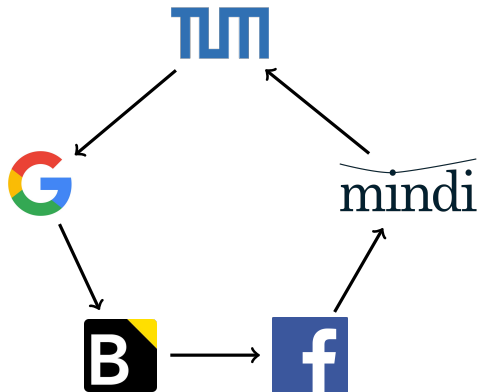
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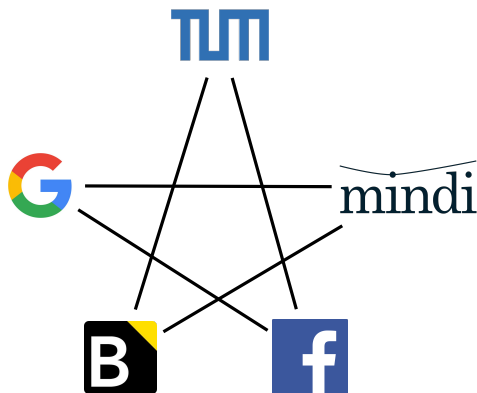
# Background



# Background



# Background



# LLVM



# LLVM

Low

# LLVM

Low Level

# LLVM

Low Level Virtual

# LLVM

Low Level Virtual Machine

# LLVM

~~Low Level Virtual Machine~~

# LLVM

~~Low Level Virtual Machine~~

lldb opt lld lljvm

# LLVM

~~Low Level Virtual Machine~~





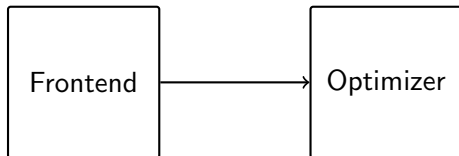


# LLVM

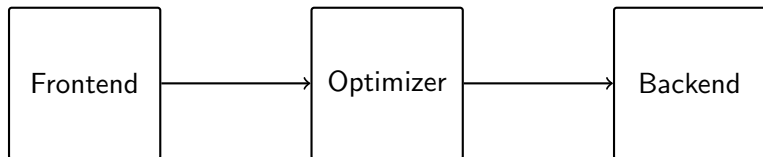


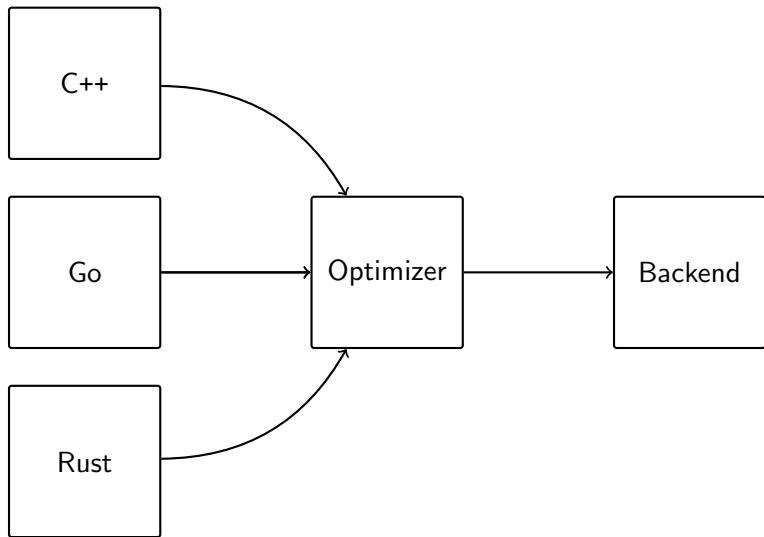
Frontend

# LLVM

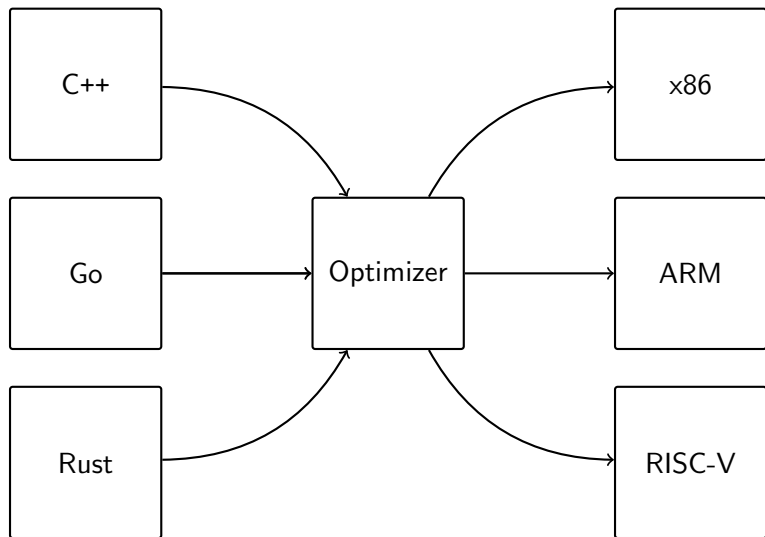


# LLVM

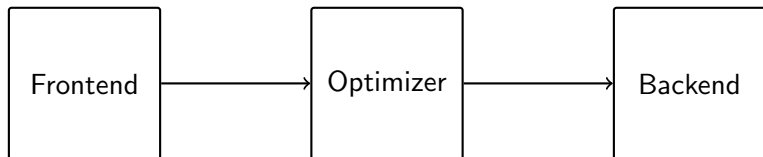




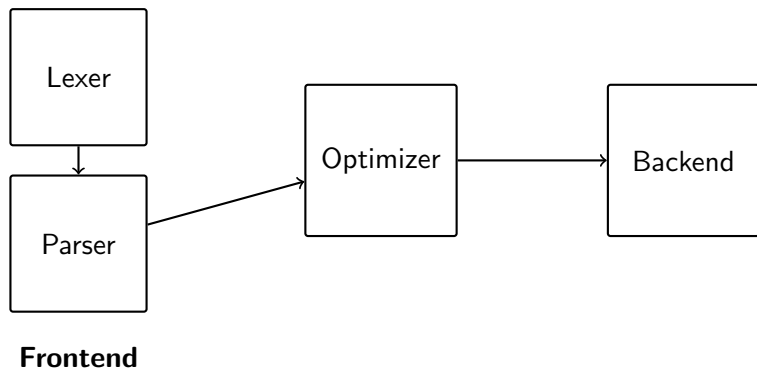
# LLVM



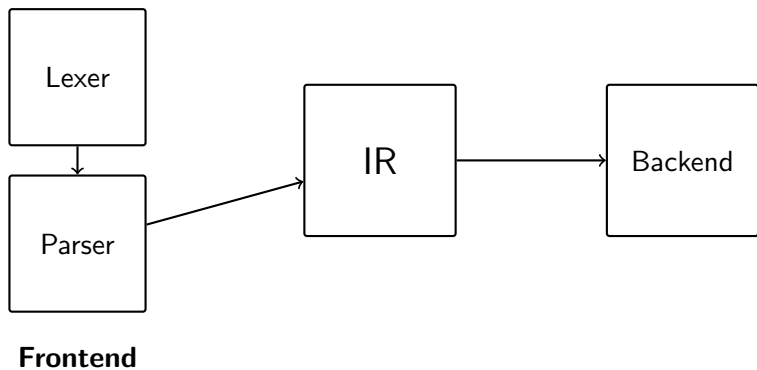
# LLVM



# LLVM

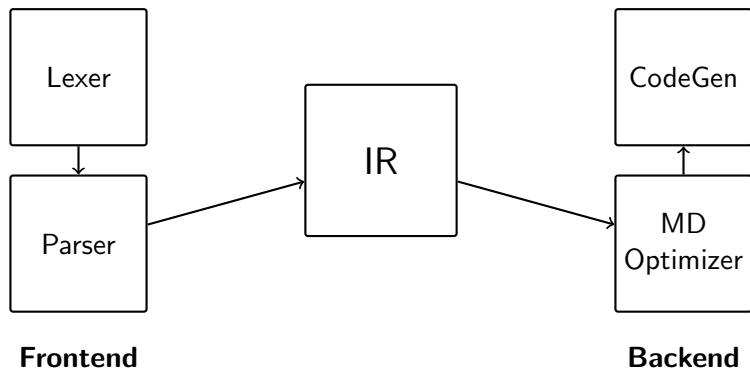


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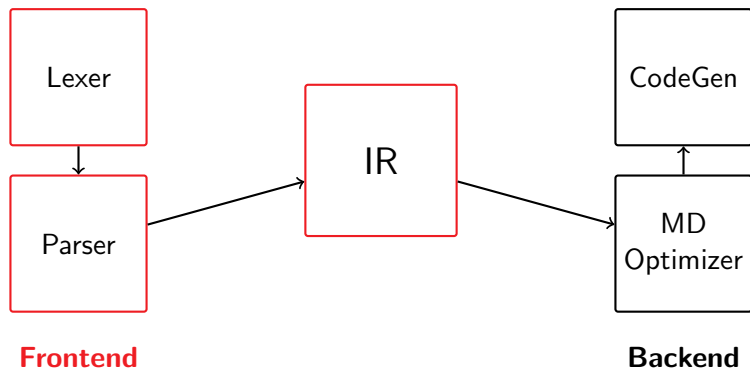




# LLVM



# LLVM

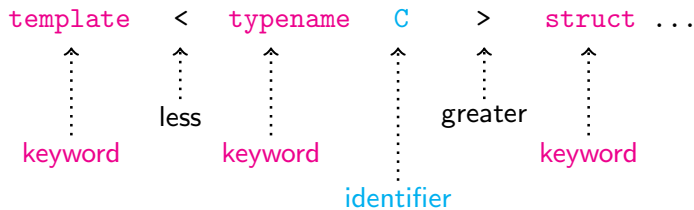


```
template<typename C>
struct L {
    char a();
    void n(int) const;
    bool g;
};
```

## clang: Lexer

```
template < typename C > struct ...
```

## clang: Lexer



# clang: Parser

## clang: Parser

```
void n ( int arg = 42 ) const ;
```

## clang: Parser

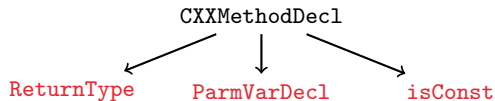
```
void n ( int arg = 42 ) const ;
```

```
CXXMethodDecl
```



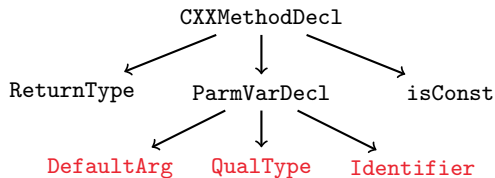
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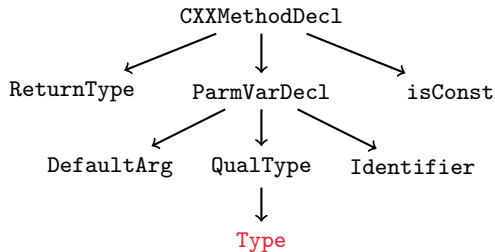
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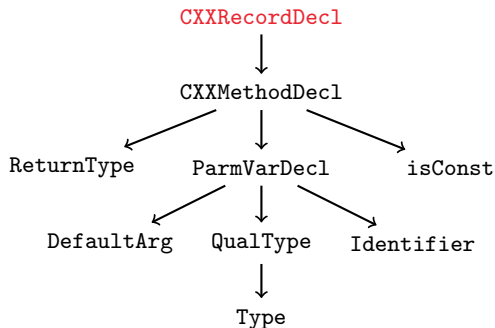
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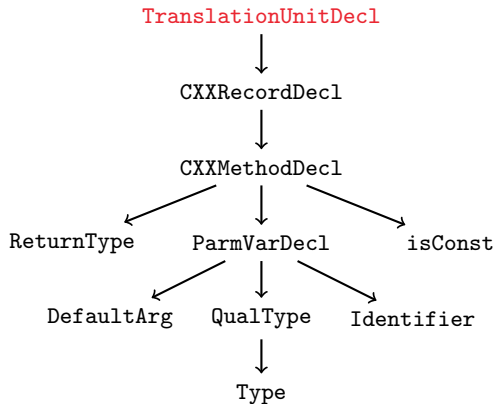
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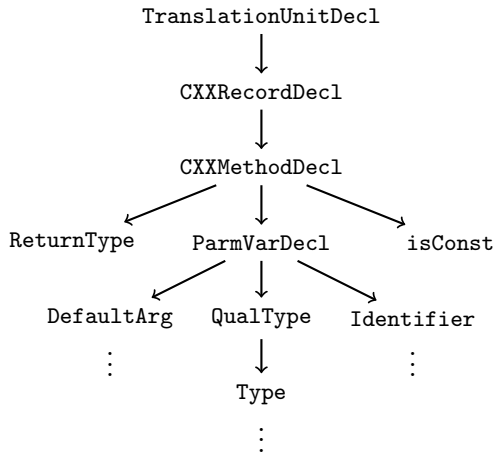
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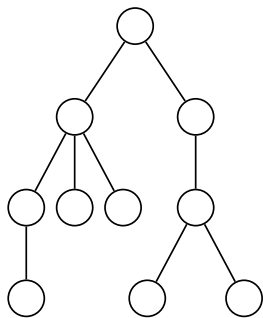
## clang: Parser

```
void n ( int arg = 42 ) const ;
```



## clang: IR Generation

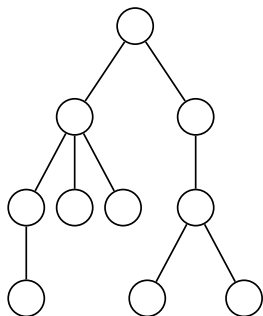
## clang: IR Generation



**AST**



# clang: IR Generation



**AST**



```
; Function Attrs: nounwind ssp
define i32 @_Z1fi(i32) #0 {
    %2 = alloca i32, align 4
    store i32 %0, i32* %2, align 4
    %3 = load i32, i32* %2, align 4
    ret i32 %3
}
```

clang: AST

## clang: AST

```
if (0xc > 1) {  
    const char* a = "ng";  
}
```

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Stmt

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```
if (0xc > 1) {  
    const char* a = "ng";  
}
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Stmt Decl

## clang: AST

```
if (0xc > 1) {  
    const char* a = "ng";  
}
```

Stmt Decl Expr

## clang: AST

```
if (0xc > 1) {  
    const char* a = "ng";  
}
```

Stmt Decl Expr Type





# Clang Tooling

# libClang

# Clang Tooling: libClang

```
#include <stdio.h>
#include <clang-c/Index.h>

CXChildVisitResult
visit(CXCursor cursor, CXCursor, CXClientData data) {
    const CXSourceLocation location = clang_getCursorLocation(cursor);
    if (!clang_Location_isFromMainFile(location)) {
        return CXChildVisit_Continue;
    }

    const CXString spelling = clang_getCursorSpelling(cursor);
    printf("%s", clang_getCString(spelling));
    clang_disposeString(spelling);

    return CXChildVisit_Recurse;
}
```

# Clang Tooling: libClang

# libTooling

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## **Clang Tidy**

# Clang Tooling: libTooling

**Clang Tidy**

**Clang Plugin**



# Clang Tooling: libTooling

**Clang Tidy**

**Clang Plugin**

**Clang Tool**

# Clang Tooling: libTooling

## **Clang Tidy**

```
./clang-tidy -checks="*,my-check" file.cpp
```

## **Clang Plugin**

## **Clang Tool**

# Clang Tooling: libTooling

## Clang Tidy

```
./clang-tidy -checks="*,my-check" file.cpp
```

## Clang Plugin

```
./clang++ -Xclang load -Xclang my-check.so \  
-Xclang -add-plugin -Xclang my-check file.cpp
```

## Clang Tool

# Clang Tooling: libTooling

## Clang Tidy

```
./clang-tidy -checks="*,my-check" file.cpp
```

## Clang Plugin

```
./clang++ -Xclang load -Xclang my-check.so \  
-Xclang -add-plugin -Xclang my-check file.cpp
```

## Clang Tool

```
./my-check file.cpp
```

# Clang Tooling: libTooling

# Clang Tooling: libTooling

const



## Clang Tooling: libTooling

```
const auto lambda = [] (auto) {  
  
};
```



## Clang Tooling: libTooling

```
const auto lambda = [] (auto) noexcept {  
  
};
```

## Clang Tooling: libTooling

```
const auto lambda = [] (auto) noexcept {  
    bool done = true;  
    flip: done = !done;  
    if (!done) goto flip;  
};
```

# How do I continue?

# Resources

- ▶ `eli.thegreenplace.net`
- ▶ `clang.llvm.org/docs/InternalsManual.html`
- ▶ `llvm.org/docs/ProgrammersManual.html`
- ▶ Random blogs on Google
- ▶ `goldsborough.me` & `github.com/goldsborough`
- ▶ Source Code!

# Stay in Touch!

- ▶ `peter@goldsborough.me`
- ▶ `linkedin.com/in/petergoldsborough`
- ▶ `github.com/goldsborough`

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`github.com/peter-can-talk/cpp-london-2017`

# Q & A