

Compiler makeover

How technical debt created happier developers

Sameera Jayasoma
WSO2

Strategy debt

The gap between what made sense then
and what we need now

Also: Your biggest opportunity

Flexible, Powerful, Beautiful Integrations as Code with Ballerina

- ✓ Open source, cloud-native programming language optimized for integration
- ✓ Batteries included: Rich ecosystem of network protocols, data formats, and connectors
- ✓ Edit/view source code textually or graphically as sequence diagrams and flowcharts
- ✓ Built-in, easy and efficient concurrency with sequence diagrams and safety primitives
- ✓ Developed by [WSO2](#) since 2016 and first released in February 2022

Download



Examples



The Evolution of Ballerina

Next-gen enterprise integration

- Replacing XML-based Apache Synapse
- Built for correctness

The #1 language for cloud-native application development

- Massive ambition, same foundation

2016

2017

2018

2019

same compiler architecture throughout

General-purpose language for integration

- Broader scope, same compiler
- Built for flexibility

Reality Check

- Strategy evolved 3 times
- Architecture evolved 0 times
- Developers started leaving

Open 99 Closed 1,299

Author ▾

Labels ▾

Projects ▾

Milestones ▾

✓ Types are not suggested in the top level Team/LanguageServer Type/Bug

#7831 · by nadeeshaan was closed on Apr 25, 2018

✓ Endpoint suggestions not working when there are annotations Priority/High Team/LanguageServer Type/Bug

#7802 · by nadeeshaan was closed on Apr 23, 2018

✓ Endpoint type suggestions not working Team/LanguageServer Type/Bug

#7801 · by nadeeshaan was closed on Apr 23, 2018

✓ Imports after org name does not work Team/LanguageServer Type/Bug

#7800 · by nadeeshaan was closed on Apr 24, 2018

✓ Invalid suggestions within the object's public scope Priority/High Team/LanguageServer Type/Bug

#7798 · by nadeeshaan was closed on Apr 26, 2018

✓ Cannot add multiple annotations bellow existing annotation Priority/Low Team/LanguageServer Type/Bug

#7795 · by nadeeshaan was closed on Jun 7, 2018

✓ Completion breaks for match statement Team/LanguageServer Type/Bug

#7794 · by nadeeshaan was closed on Apr 25, 2018

✓ Completion missing for attached functions in a variable definition Team/LanguageServer Type/Bug

#7792 · by nadeeshaan was closed on Apr 23, 2018

✓ Match Keyword completion won't work for some cases Priority/High Team/LanguageServer Type/Bug

#7737 · by nadeeshaan was closed on May 7, 2018

✓ Language server does not suggest completion Items over http package Team/LanguageServer Type/Bug

#7351 · by nadeeshaan was closed on Apr 17, 2018

✓ Language server adding imports in wrong place (VSCode) Team/LanguageServer Type/Bug

#5416 · by pzfreo was closed on May 10, 2018

Author ▾ Labels ▾ Projects ▾ Milestones ▾

#7831 · by nadeeshaan wa

#7802 · by nadeeshaan wa

#7801 · by nadeeshaan wa

#7800 · by nadeeshaan wa

#7798 · by nadeeshaan wa

#7795 · by nadeeshaan wa

#7794 · by nadeeshaan wa

#7792 · by nadeeshaan wa

#7737 · by nadeeshaan wa

#7351 · by nadeeshaan wa

#5416 : by n3fneo was close

Author ▾ Labels ▾ Projects ▾ Milestones ▾

#9453 · by nadeeshaan was closed on Aug 27, 2018. 0.982.0

#9423 · by rasika was closed on Jul 6, 2018

#9365 : by nadeeshaan was closed on Dec 11, 2018

#9359 : by nadeeshaan was closed on Jul 3, 2018. 0 980 0

#9300 - by nadeeshaan was closed on Jul 2, 2018. 0 980 0

#000000 by kausar was closed on Jul 2, 2019 #000000

.....

match statement completion for records and so

© 2006 The Authors
Journal compilation © 2006 Blackwell Publishing Ltd

#9179 · by DSotnikov was closed on Jun 24, 2018

Open 99 Closed 1,299

Author Labels Projects Milestones

Types are not suggested

#7831 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Endpoint suggestions

#7802 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Endpoint type suggestions

#7801 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Imports after org name

#7800 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Invalid suggestions

#7798 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Cannot add multiple suggestions

#7795 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Completion breaks suggestions

#7794 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Completion missing suggestions

#7792 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Match Keyword completion

#7737 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Language server does not suggest

#7351 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Language server adds suggestions

#5416 · by pzfreo was closed on Dec 12, 2018 · 0.990.0

Open 99 Closed 1,299

Author Labels Projects Milestones

Completions for first imports

#9453 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Record invocation autocorrection

#9423 · by rasika was closed on Dec 12, 2018 · 0.990.0

Match Expression Completion

#9365 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Cannot import packages in test sources

#9359 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Completions for Binding annotations

#9300 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

LS suggest private methods

#9288 · by hevayo was closed on Dec 12, 2018 · 0.990.0

Auto Completions breaks

#9266 · by pahans was closed on Dec 12, 2018 · 0.990.0

Match Statement completion

#9264 · by nadeeshaan was closed on Dec 12, 2018 · 0.990.0

Code completion fails for imports

#9180 · by DSotnikov was closed on Dec 12, 2018 · 0.990.0

Code completion fails for annotations

#9179 · by DSotnikov was closed on Dec 12, 2018 · 0.990.0

Open 99 Closed 1,299

Author Labels Projects Milestones

Create variable code action fails for .length()

#11509 · by rasika was closed on Dec 5, 2018 · 0.990.0

LS createVariable and createFunction does not add package prefix and imports

#11431 · by rasika was closed on Dec 5, 2018 · 0.990.0

References, Go to Definition and Rename does not work in test sources

#11265 · by nadeeshaan was closed on Nov 12, 2018 · 0.990.0

Missing namespace declaration suggestion in Service body scope

#11197 · by nadeeshaan was closed on Nov 12, 2018 · 0.990.0

Go to definition does not work between modules in the same project

#11144 · by nadeeshaan was closed on Dec 20, 2018 · 0.990.1

Fix renaming, references and code diagnostics fails for inner directories

ballerina-platform/ballerina-lang#11120 · by rasika was closed on Oct 30, 2018

LS renaming, references fails for inner directories of the modules

#11052 · by rasika was closed on Oct 31, 2018 · 0.983.0

Source gen unable to render worker receive and worker send key expression

#10873 · by NipunaMarcus was closed on Oct 17, 2018 · 0.983.0

VSCode formatter actually removes ?, creating compilation errors

#10857 · by autodidaddict was closed on Oct 17, 2018 · 0.983.0

Incorrect order of Documentation when there are annotation attachments in resources and services

#10795 · by nadeeshaan was closed on Oct 17, 2018 · 0.983.0

Ballerina VSCode Plugin Issues (2019)

User Feedback:

- Only one error shown at a time

"Fix one error to see the next one"

- Poor Performance

"Slow response to keystrokes"

- Confusing Error Messages

"Hard to understand what's wrong"

Quick Fix: Hack the ANTLR parser

But we decided to understand the root cause instead...

Traditional Compiler

Batch Processing

- Full compilation on each keystroke
- Stop on first error
- Restart entire process

Result: Poor IDE Experience



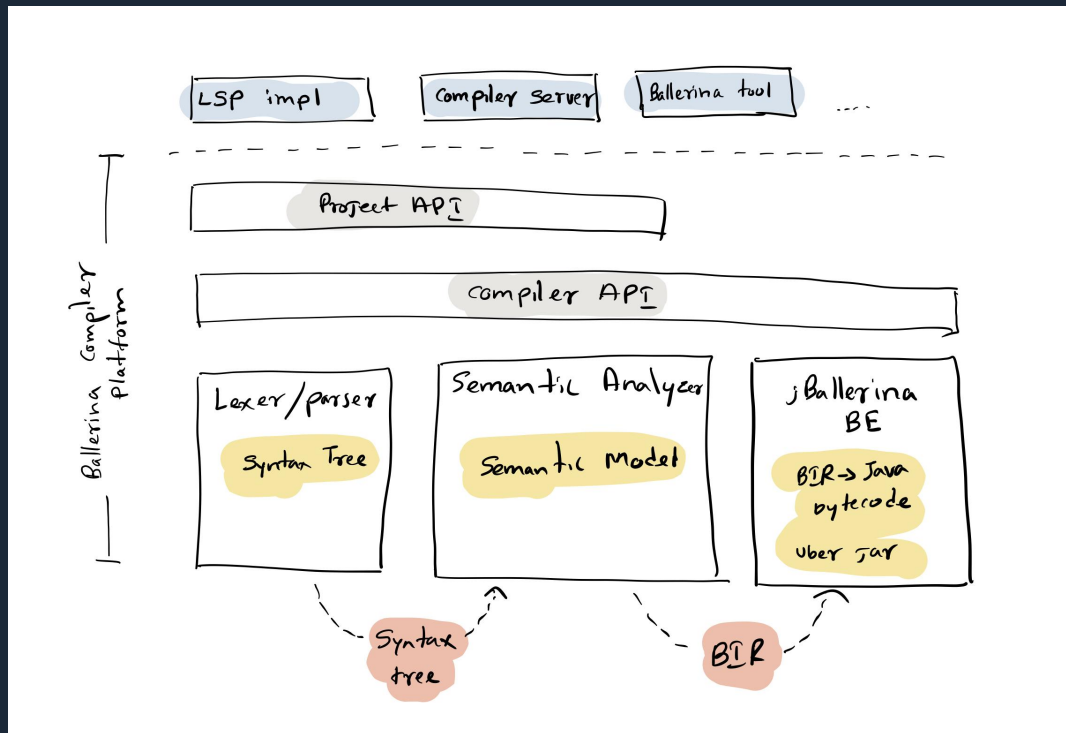
Modern Compiler Design

Compiler as a Library

- Incremental processing
- Multiple error reporting
- API-driven design

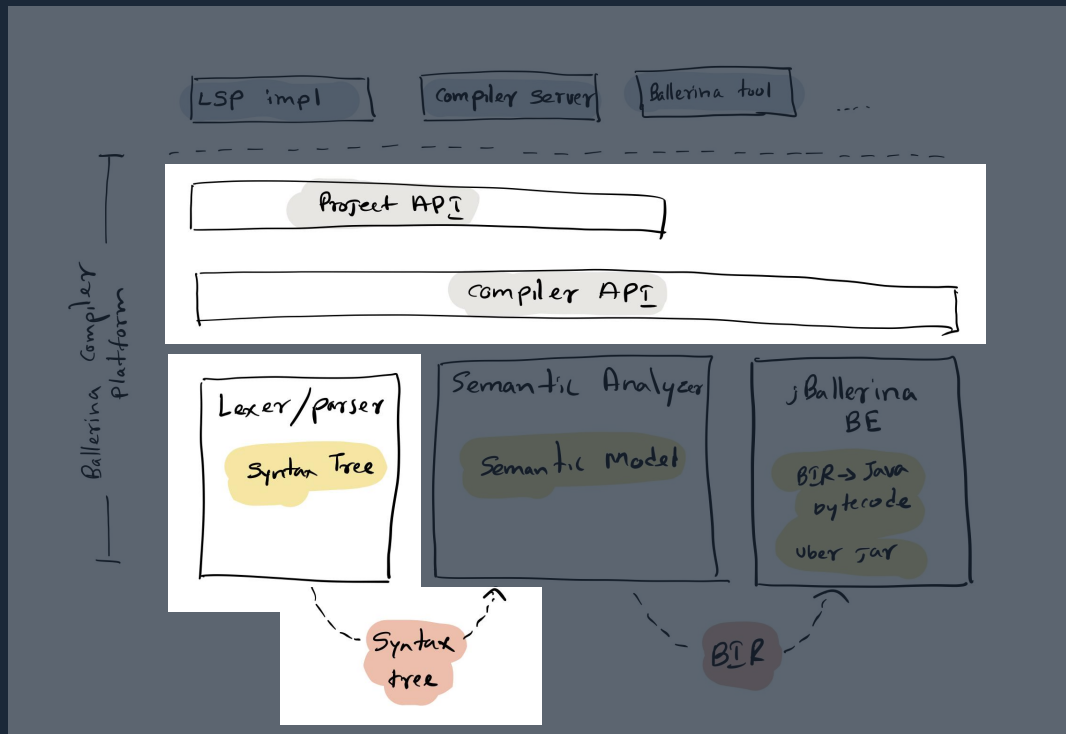
Result: Better Developer Experience

Ballerina Compiler Platform



Original proposal sketch - 2020

Ballerina Compiler Platform



What Changed When We Invest Our “Debt”?

Developer retention

Developer who left came back, and brought friends

Internal productivity

We stopped fighting tools and started shipping features

Your Move

Don't just fix → Reframe

When everyone sees burden, find the hidden capital

Don't wait for permission → Create conviction

Build the prototype. Show the path. Lead

Don't rebuild → Evolve

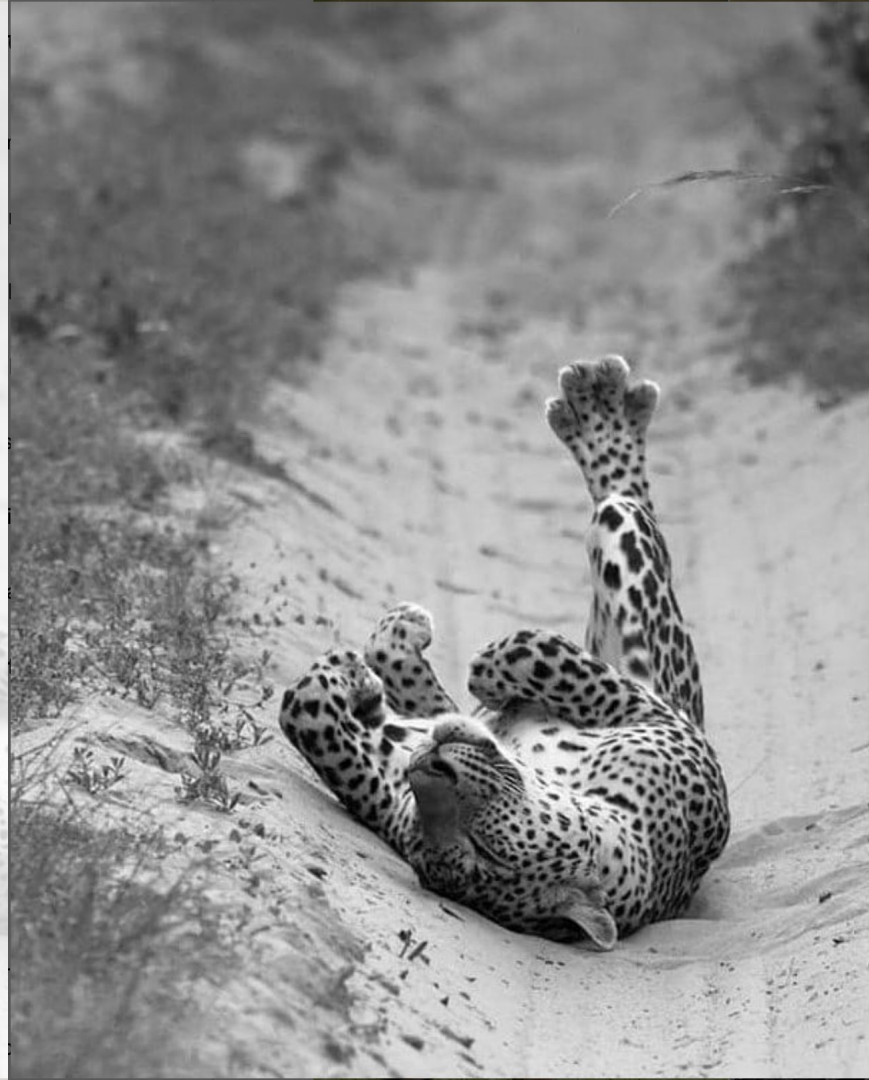
Transform one piece at a time

“

If you build it, they might not come.

But if you don't build it, they **definitely** can't.

”



Thank You