CS131 HW6 - Dart Report

Abstract

This report is to research Dart programming language and its support software. At the beginning, the paper will introduce basic concepts of TensorFlow, Flutter and Dart. Moreover, the paper would evaluate Dart for running the model. The research includes the examination of the Dart language and system documentation, analysis of the strength and weakness of Dart, the anticipated problem when using Dart. Later, the features of Dart 2.7 will be compared and contrasted to the features of Ocaml, Java, and Python. The analysis will mainly focus on the technology's effects on ease of use, flexibility, generality, performance, reliability. Eventually, the paper will conclude that if Flutter using Dart is a good fit for the proposed application.

1. Introduction

Company GarageGarner is going to develop a new vision of its mobile app which can run most of the algorithms in users' phones, so that the application can run faster. One of the proposed features is that the user can take a panorama of the items and price tags on display, then the app can quickly report to the user on the best deals. The current version can

TensorFlow Lite has been selected for running the model on cell phones. And currently Flutter user interface toolkit which is writing in Dart is one of the technology alternatives for writing and running the app's user interface. To know if Flutter is a good option, it is imperative to investigate Dart programming language.

In this investigation, the chosen edition of the language is Dart 2.7 and Flutter 1.12 (2019-12-11), along with tflite v1.0.5 (2020-02-26).

2. Dart

Dart is an object-oriented programming language created and backed by Google, which could be optionally trans compiled into JavaScript. It is also a language that can be compiled to the ARM machine code used in most mobile devices. Unlike other programming languages, Dart has its own package manager called Pub.

Flutter is a young technology using Dart, it has grown fast in recent years. The below graph shows the interest in Flutter on StackOverflow prior to the Release Preview 2 launch in comparison with other front-end frameworks.

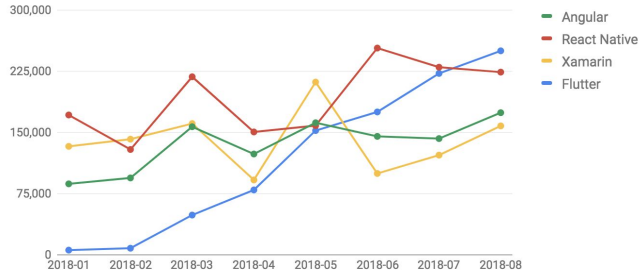

Figure 1. Number of StackOverflow question views

2.1 Flexibility

Dart provides a high level of flexibility to the developers, it can be used as a client-side as well as a server-side language. It can be run on multiple platforms. For example, Mobile applications written in Dart with Flutter are cross-platform, which means they could run on both iOS and Android. Dart can also be used to write web apps and run on any browser. At the same time, Dart is a class-based typed language that adds to the versatility of the language.

2.2 Generality

Generality is one of the distinctive features of Dart. Dart was designed to operate on arbitrary discrete devices. In some cases. Dart's generality is a source of enhanced efficiency.

2.3 Performance

Dart has various compilation types, AOT and JIT compilers. Flutter took advantage of this fact, as using JIT compilation speeds up development.

Ahead-of-time (AOT) compiled code is guaranteed to have fast startup and consistent runtime performance, with no latency,

Although Just-in-time (JST) compiled code is slower at startup, it has better peak performance after it runs long enough for runtime optimizations to be applied.

Flutter makes devs more productive. One important reason is that it has Hot Reloading enabled by default. Hot Reloading keeps the app running and to inject new versions of the files that the developers edited at runtime, there would be no loss of state, which means it doesn't need to do a full reload when importing modules or putting new files. It could save a lot of time, and thus boosts productivity. It is extremely useful while tweaking the UI, which means it is suitable for the application that we are building.

2.4 Reliability

Dart has the ability to hand multiple concurrent inputs reliably for writing software for embedded systems. It avoids preemptive multitasking which provides advantages on the server side with safe typing.

2.5 Learn Curve

Dart syntax is simple. It is strongly statically typed and supports type inference (automatic detection of the data type of an expression). Type inference makes programming tasks easier, enabling the developers free to omit type annotations while still permitting type checking. In other hand, the structure of Dart language is similar like C, Java, or C#, which let the developers get familiar with this language in a short time.

3. Comparison with other language

3.1 Dart vs Ocaml

As mentioned above, Dart supports type inference, Ocaml can do the same thing in its strong static types.

Ocaml has no side-effects since the variables' values never changed including global variables. Variables in Dart are changeable, but the side effects could be avoided.

3.1 Dart vs Java

Dart is considered a client-optimized programming language while Java is a general-purpose programming language. Moreover, they both are statically-typed, object-oriented programming languages. In fact, they are also similar in some criterias: readability, reliability, cost, and generality. What is more, they both are class structure.

However, Dart does not have the general-purpose property of Java. In fact, Dart is considered Google specific language. In Dart, class code cannot be written, which is a contrast to Java. One reason is that Dart is purely object-oriented while Java is not.

3.2 Dart vs Python

Dart is a statically typed language, in contrast, Python is a dynamically typed language. Python has much stronger popularity than Dart, which means that Python developers are likely to be able to easily find answers for their questions while Dart developers don't since there is a small community for Dart users.

However, Dart does have great tooling support and can help with developing Dart applications such as Pub, server-side VM.

4. Potential Problems

Dart does have some weakness. Since Flutter is developed by Google, it is fast to build Android apps on Flutter since Google is directly interested in fixing bugs in the shortest amount of time. But for iOS platform, the update speed of the design features are not up to date as fast as Android's version.

Another weakness problem is the size for Flutter application is usually large. In general, the size of mobile applications should be minimized since users have limited storage on their cell phones. For example, the release file size of the simplest "Hello World" app would reach 4.7 MB, which is for the bare minimum app. It remained much bigger than native Java (539KB) and Kotlin (550KB) apps.

5. Conclusion

Dart is an interactive language, it is easy to learn. It is fast, reliable, and efficient. Compared with other languages, it is especially useful when tweaking the UI. Therefore, Flutter using Dart is suitable for the proposed application that we are building.

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