

Session 3

Pre-processing JavaScript Files

Objectives

By the end of this session, students will learn to:

- ▶ Describe what a preprocessor is
- ▶ Explain supported preprocessors in detail
- ▶ Explain how preprocessing happens in JavaScript

JavaScript Preprocessor Overview

Preprocessor

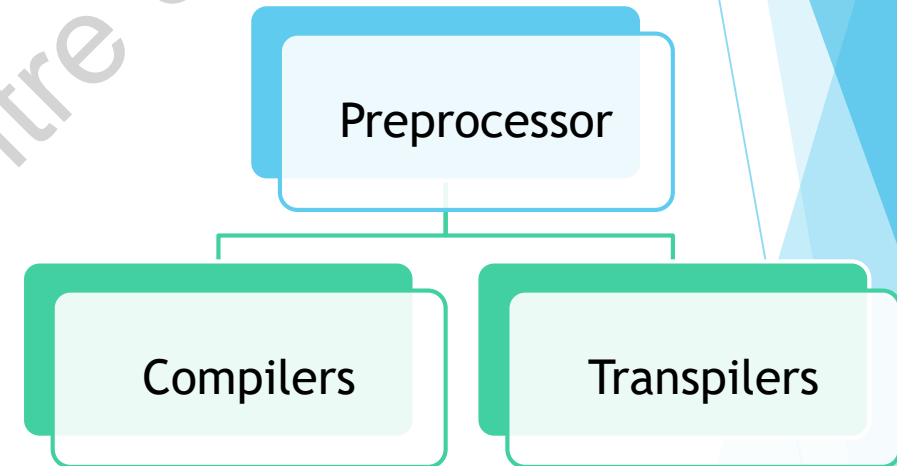
- ▶ Program or a set of codes that uses an arbitrary source file as its input data and gives an output data



- ▶ Converts files into a format that a browser or similar program is able to read or understand easily
- ▶ Various kinds of preprocessors exist and processing done by them depends on their characteristics or types

JavaScript Preprocessor Types

- ▶ Compilers are preprocessors that convert different language into JavaScript.
- ▶ Transpilers convert a superset or new language standard down to today's browser and are source-to-source compilers.



Chrome DevTools Overview

Chrome DevTools:

Is in-built with the Google Chrome browser

Comprises a set of Web development tools

Captures JavaScript before compilation

Allows JavaScript to be transcoded

Facilitates an artificial runtime to be constructed in JavaScript

Chrome DevTools API

Chrome Devtools extension uses **reload** JavaScript preprocessor function.

Arguments of the JavaScript preprocessor function reload

1. Source to preprocess
2. URL of the Source
3. Script or Function name

Compilation of the preprocessor happens only once, just before the first JavaScript is encountered.

Supported Preprocessors and Transcompilers

- ▶ Server-side Web development uses several other languages, technologies, and frameworks.
- ▶ Client-side programming uses JavaScript as the primary option as all browsers support it.
- ▶ Newer languages developed can compile down to JavaScript. These offer:
 - ▶ Improved syntax that hides the complexity of new language
 - ▶ Better way to write and manage large code
- ▶ Available transcompilers are:



CoffeeScript



TypeScript



Traceur



Babel



UglifyJS



CoffeeScript Language and Compiler

Features include:

Language that compiles or merges into JavaScript

Compiles on a one-to-one basis

Allows surgical modifications

Makes it easier to fix errors related to syntax in JavaScript, such as:

- Default arguments
- List comprehension
- Multi-line strings
- OOP classes
- Splat operators
- String interpolation
- Unstructured assignment

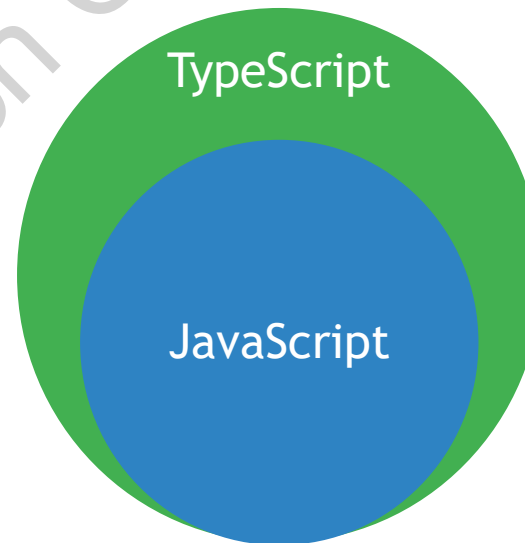


Using CoffeeScript

- ▶ The CoffeeScript compiler is installed using the command:
`npm coffeescript`
- ▶ npm is the default package manager for JavaScript runtime environment, Node.js.
- ▶ Node.js is installed on the server where the Website is hosted.
- ▶ Node.js enables faster execution of JavaScript. Its non-blocking capabilities results in faster Input/Output.
- ▶ npm comprises command-line client and npm registry.
- ▶ Coffee binary file is generated after the compilation of CoffeeScript package.

TS TypeScript Language and Compiler

- ▶ Object-oriented, statically typed, and a compiled language designed by Anders Hejlsberg.
- ▶ Superset of JavaScript that is more suitable for application-scale development.
- ▶ Better features as compared to JavaScript and has introduced syntax enhancements in JavaScript language.



TS

TypeScript Features

Features include:

Built on JavaScript

Supports tools, libraries, and frameworks of JavaScript

Converts to JS equivalent by renaming files

Runs in all JavaScript friendly environment

Aligns with ECMAScript provisions

ECMAScript 5



ECMAScript 6



Additional
Features



TS

TS Benefits of TypeScript

Inclusive
Compilation

Solid Static Typing

Type Definition
Support

Object-Oriented
Programming

TypeScript
Elements



Traceur Compiler

Traceur compiler/transpiler that uses all JavaScript features by Google and excludes the complications with the massive build system.

Traceur makes all features of ES6 accessible and supports a few experimental features of ES.next.

BABEL Overview of Babel

Is an open-source JavaScript compiler and configurable transpiler

Has plug-ins that provide specific conversions for Web development and makes it easier to convert JSX markup into JavaScript

Converts the codes of ECMAScript 2015+ into compatible versions

Converts edge JavaScript into plain old ES5 JavaScript

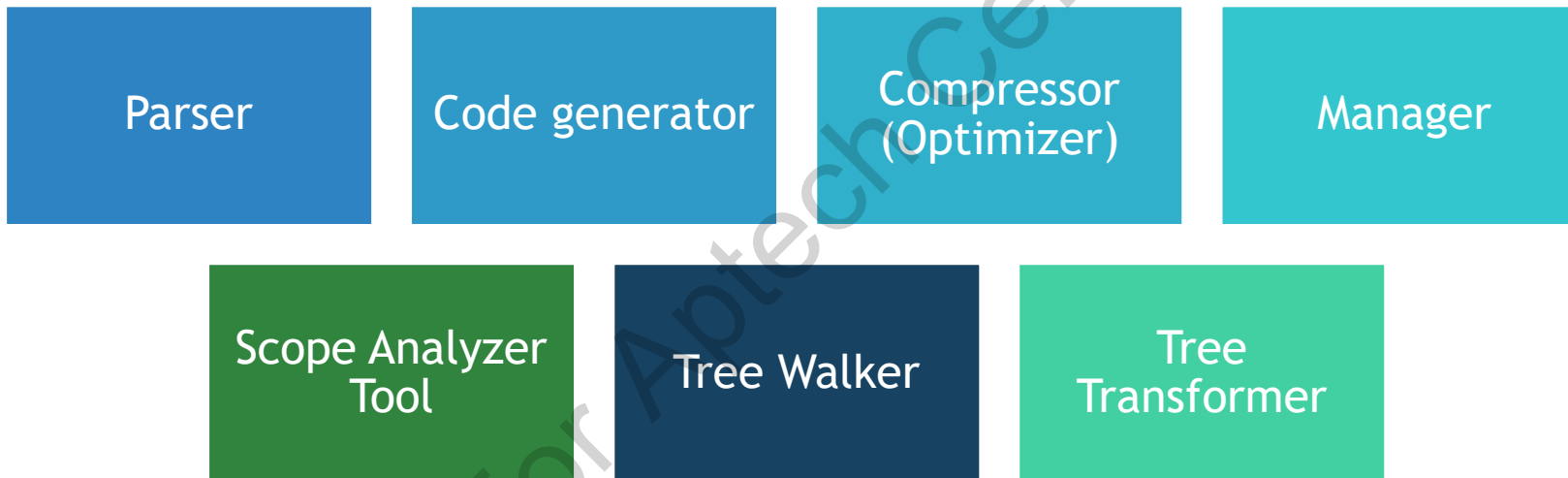
Provides functional features such as transform syntax, source code transformations, and polyfill missing features

Fact - Babel (core version) is downloaded five million times every month!



Overview of UglifyJS

- ▶ UglifyJS is a toolkit, compressor, parser, and minifier that help to automate working with the JavaScript code.
- ▶ UglifyJS tools include:



- ▶ UglifyJS enhances performance although reduces readability.

Fat Arrow Functions Overview

- ▶ Arrow functions are a short and crisp syntax for writing function expressions in JavaScript.
- ▶ Fat arrow functions are anonymous and were introduced with ES6.
- ▶ Fat arrow functions save developers time and simplify function scope.
- ▶ Lexical scoping defines how variable names are determined in nested functions.
- ▶ Inner functions contain the scope of parent functions even if the parent function has returned.

Preprocessing JavaScript - CoffeeScript

Two ways to execute or run CoffeeScript:

Manually compile the code and run the output JavaScript code as a Node.js application

Run the original code through the Node.js run configuration and compile it during run

Preprocessing JavaScript - TypeScript

- ▶ TypeScript supports Node.js since its evolution.
- ▶ All the code of TypeScript goes in the src folder.
- ▶ The generated JavaScript goes in the lib folder.

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Session Summary

- ▶ A preprocessor is a program or programs that uses an arbitrary source file as its input data and produces output that another program can use as input.
- ▶ JavaScript preprocessors are of two types - compilers or transpilers.
- ▶ The widely used preprocessors are:
 - ▶ CoffeeScript is a language that transcompiles into JavaScript.
 - ▶ TypeScript is an object-oriented, statically typed, compiled language.
 - ▶ Traceur takes ES6 and compiles it to regular ES5 that can run in the browser.
 - ▶ Babel turns ES6 into code that runs in the browser (or on the server).
 - ▶ UglifyJS is a toolkit, compressor, parser, and minifier that help to automate working with the JavaScript code.
- ▶ Fat arrow functions are anonymous and were introduced with ES6.