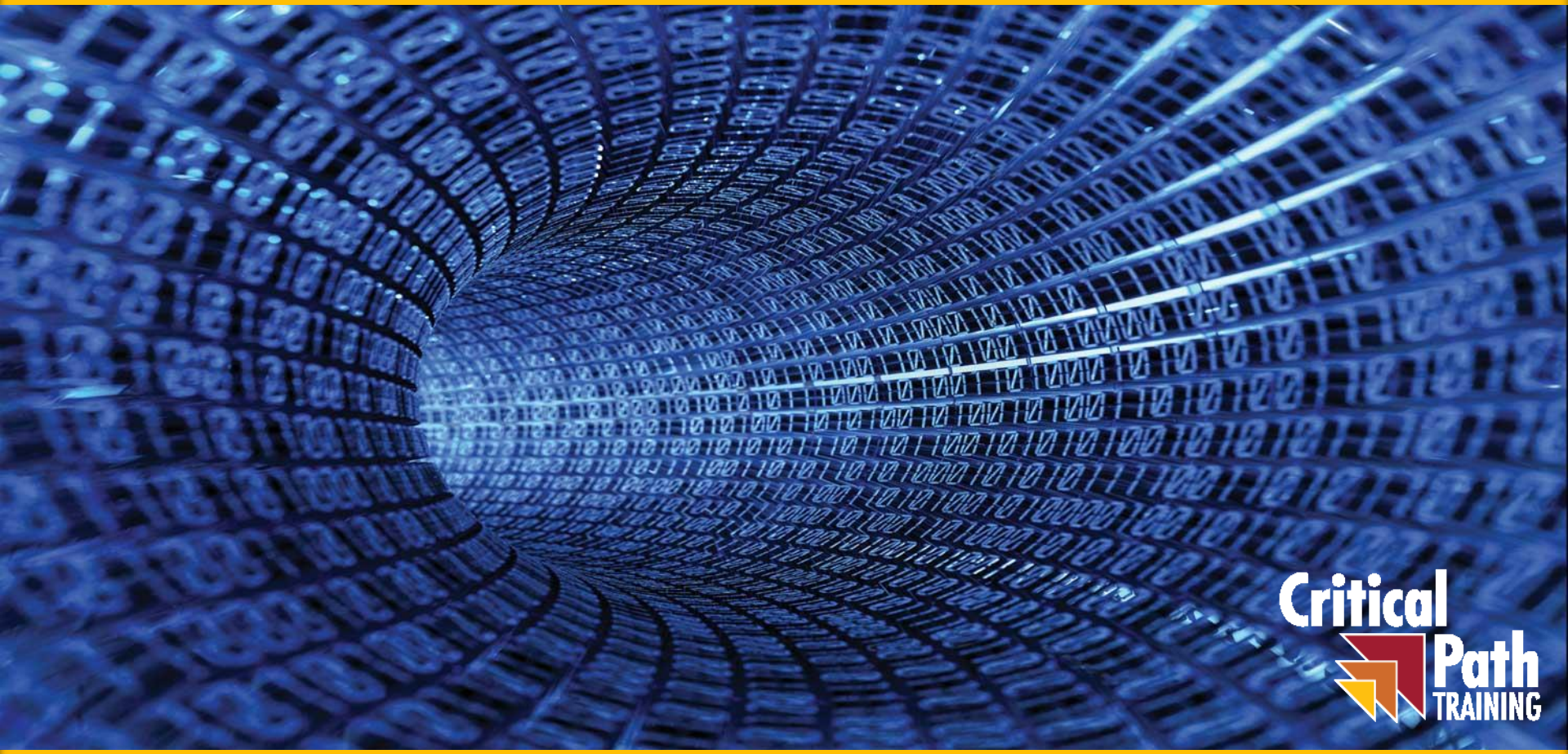
Developing with Node.js and Visual Studio Code



Agenda

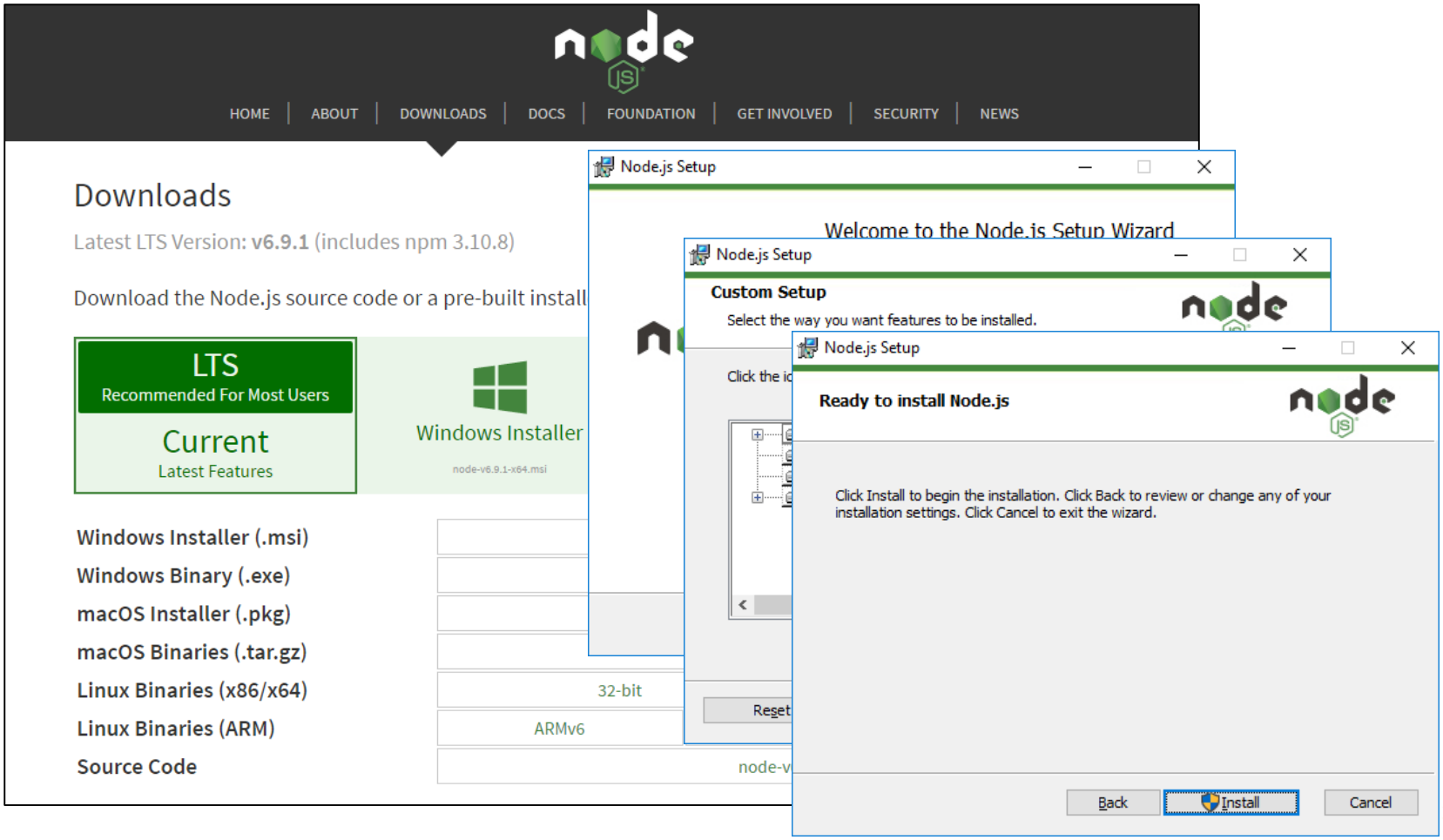
- Introduction to Node.JS and NPM
- Installing and Updating Packages in Visual Studio Code
- Adding TypeScript Support to a Node.js Project
- Configuring Node.js with Server-side Debugging Support
- Using Gulp to Automate Running Development Tasks
- Developing Projects using Webpack

Cross-platform Toolchain

- Node.js
- Node Package Manager (npm)
- TypeScript
- Gulp
- Webpack

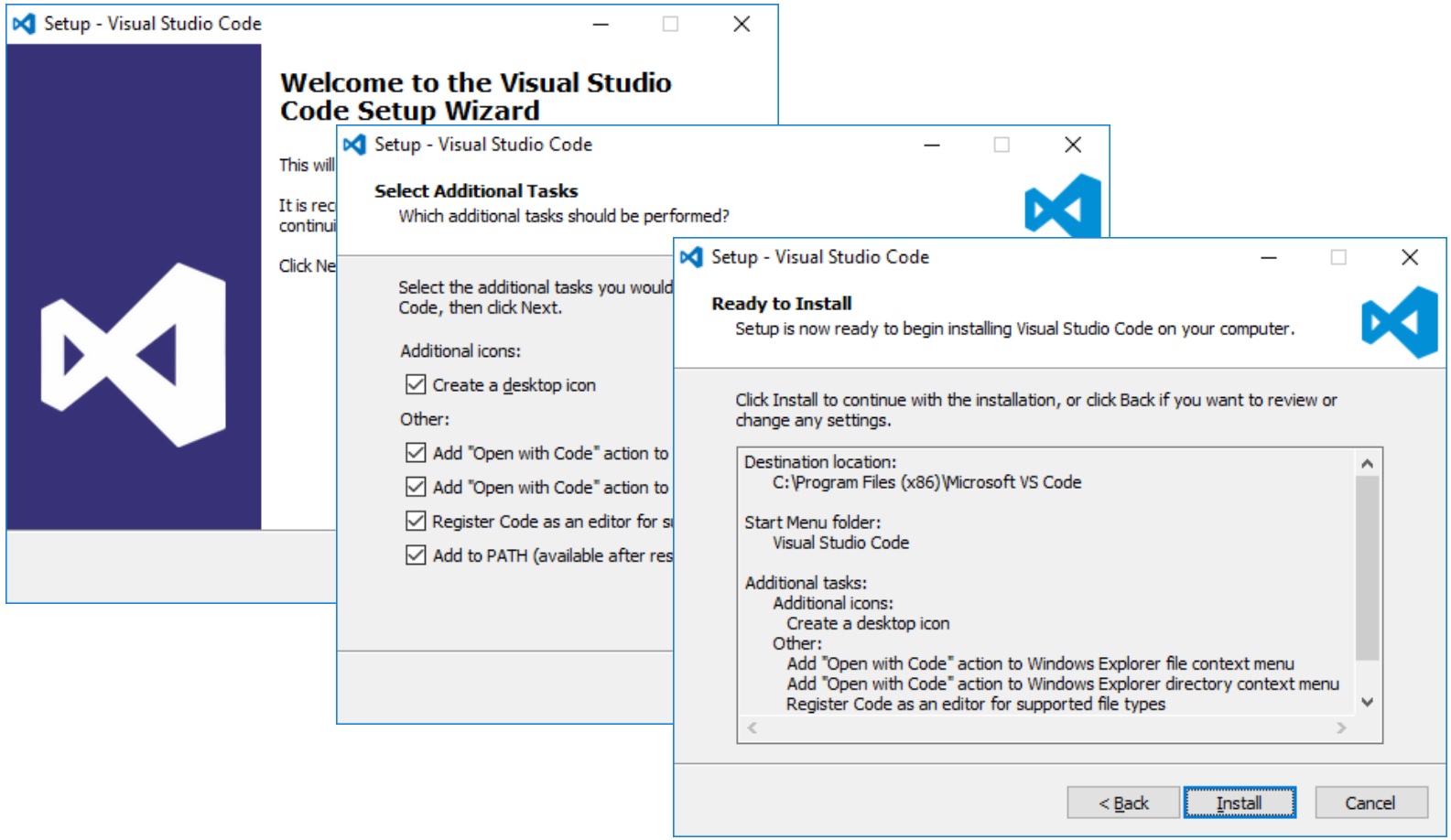
Installing node.js

- https://nodejs.org/en/download/



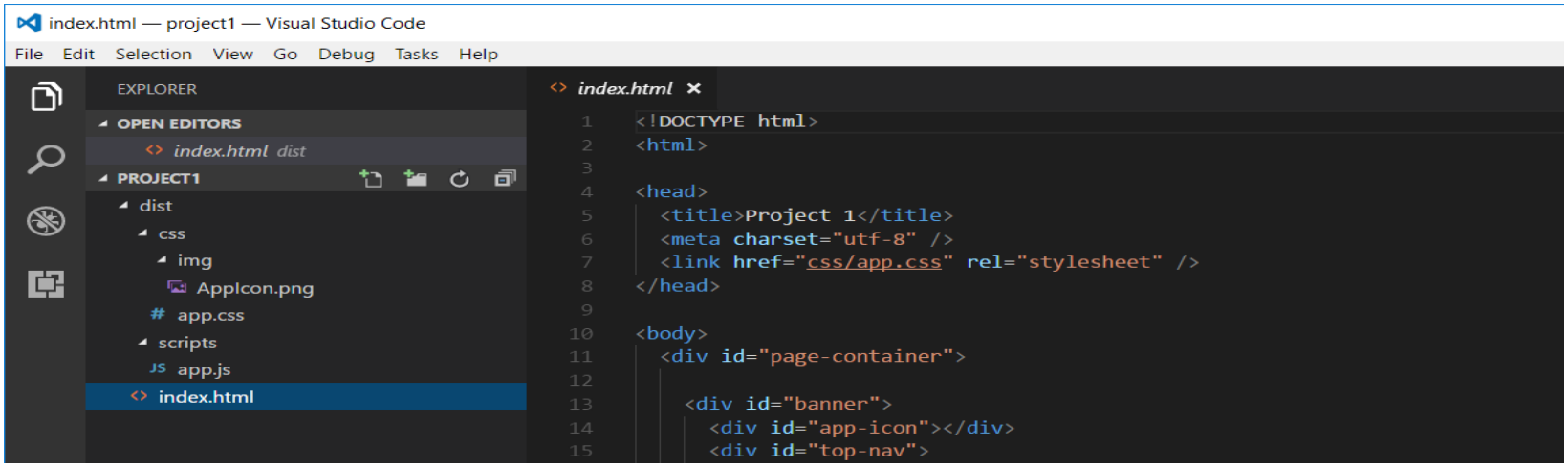
Install Visual Studio Code

- http://code.visualstudio.com/



Developing with Visual Studio Code

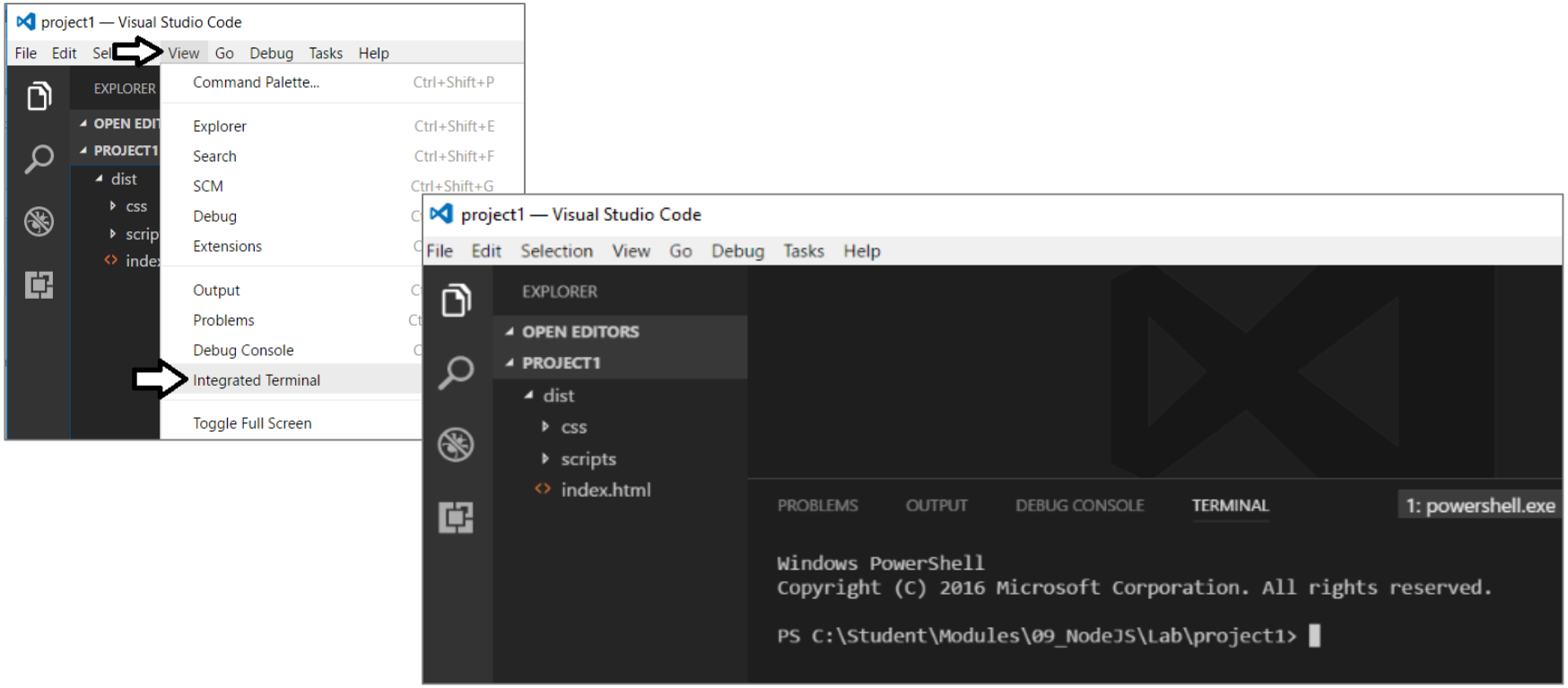
- Node.js is agnostic when it comes to developer IDE
  - There are many different IDEs that people use with Node.js
  - This course will be using Visual Studio Code



- Visual Studio is not a good fit for Node.js development
  - Visual Studio solution & project files incompatible with Node.js

Integrated Terminal

- Use the Integrated Terminal to execute **npm** command



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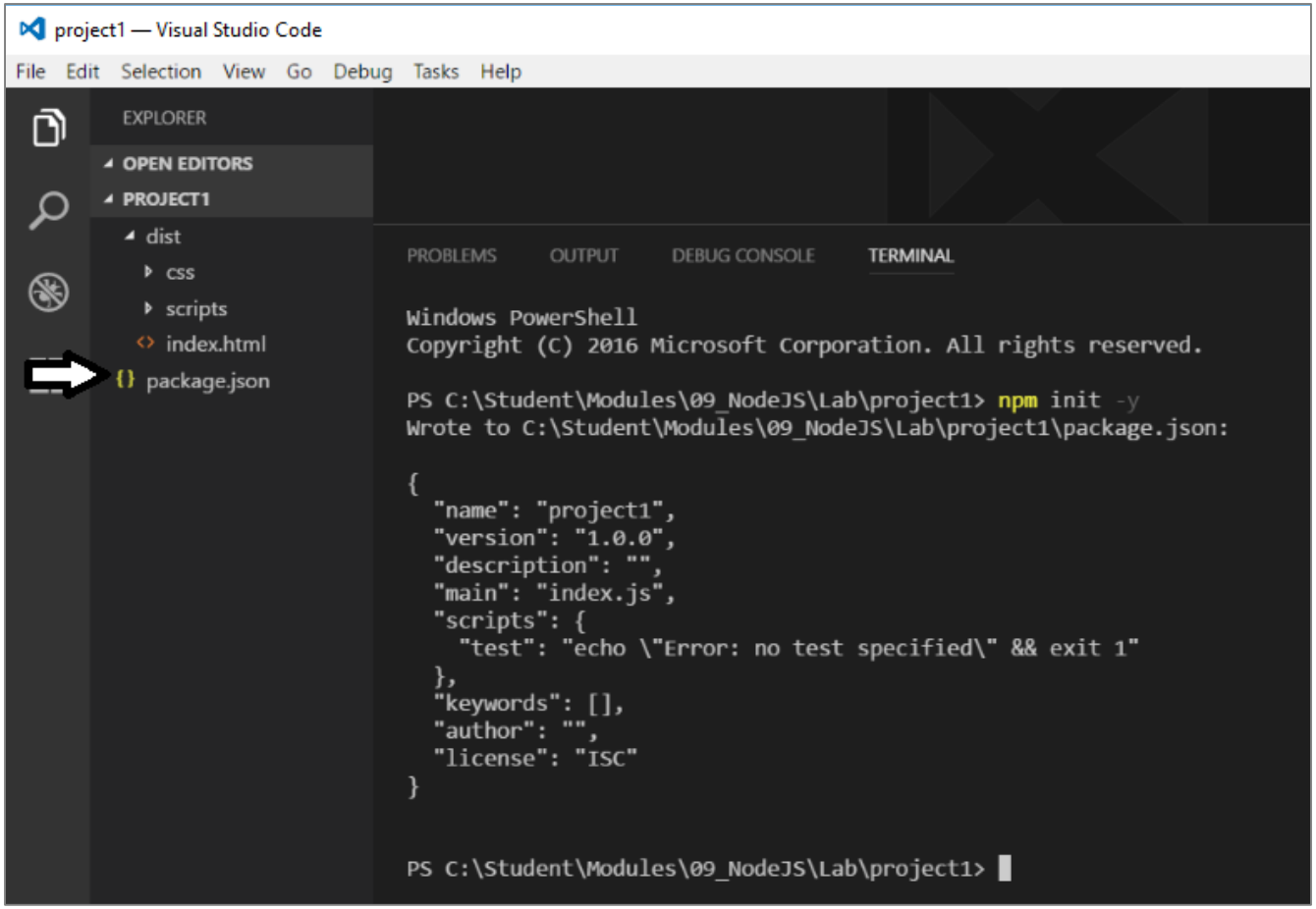
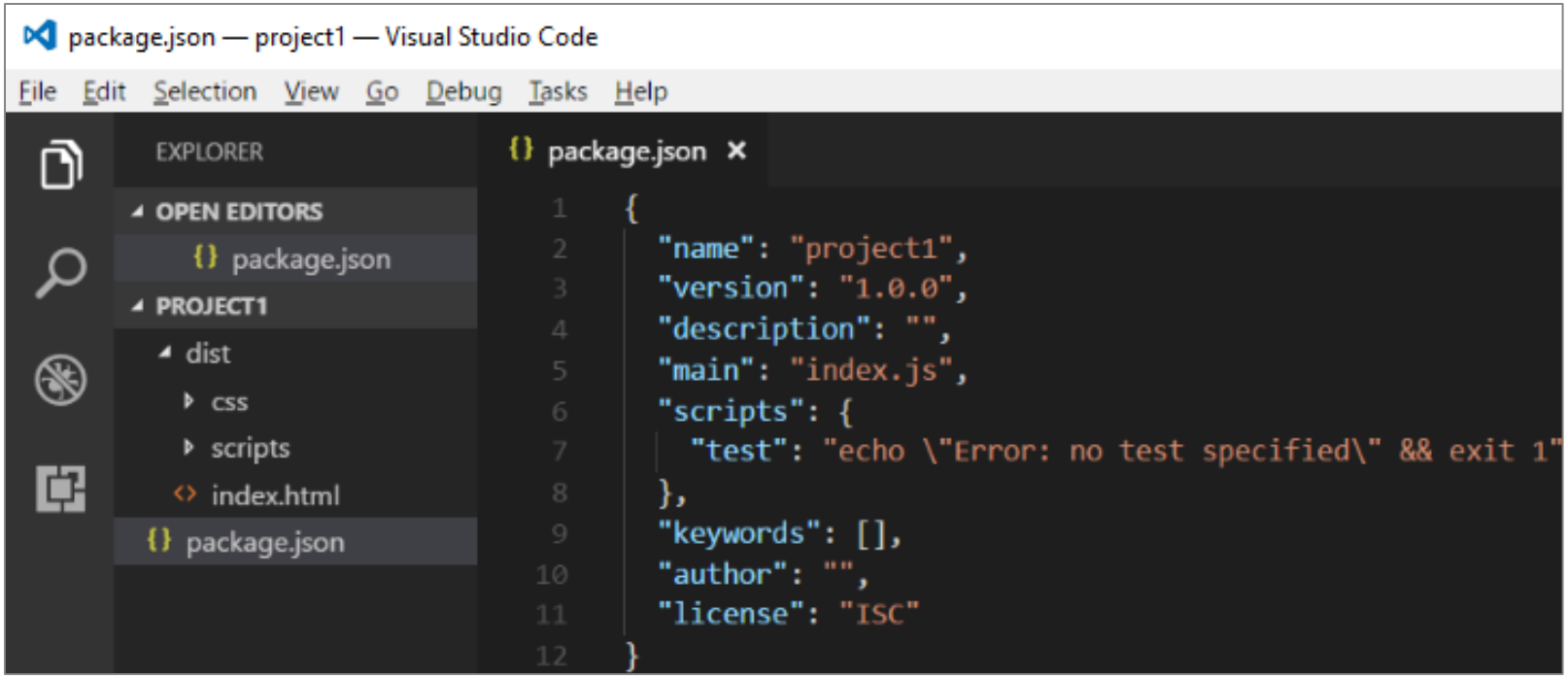
npm init

- Node.js projects initialized with **npm init** command
  - This command created the **package.json** file



package.json

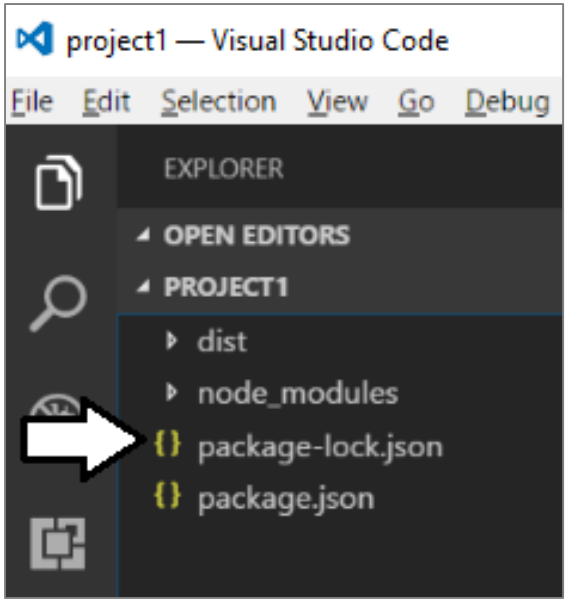
- **package.json** serves as project manifest file
  - Tracks project name and version number
  - Tracks installed package dependencies



Installing Packages

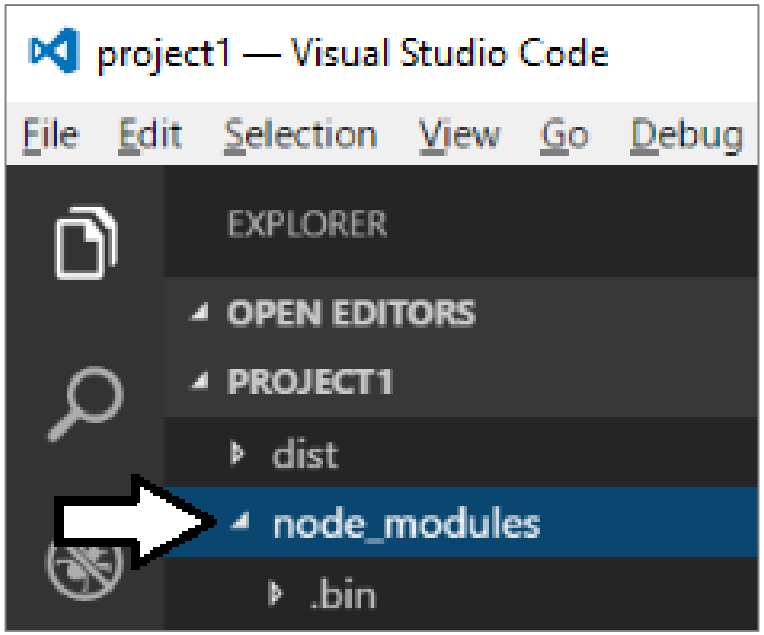
```
npm install browser-sync --save-dev
```

```
"devDependencies": {
  "browser-sync": "^2.18.12"
}
```



node_modules folder

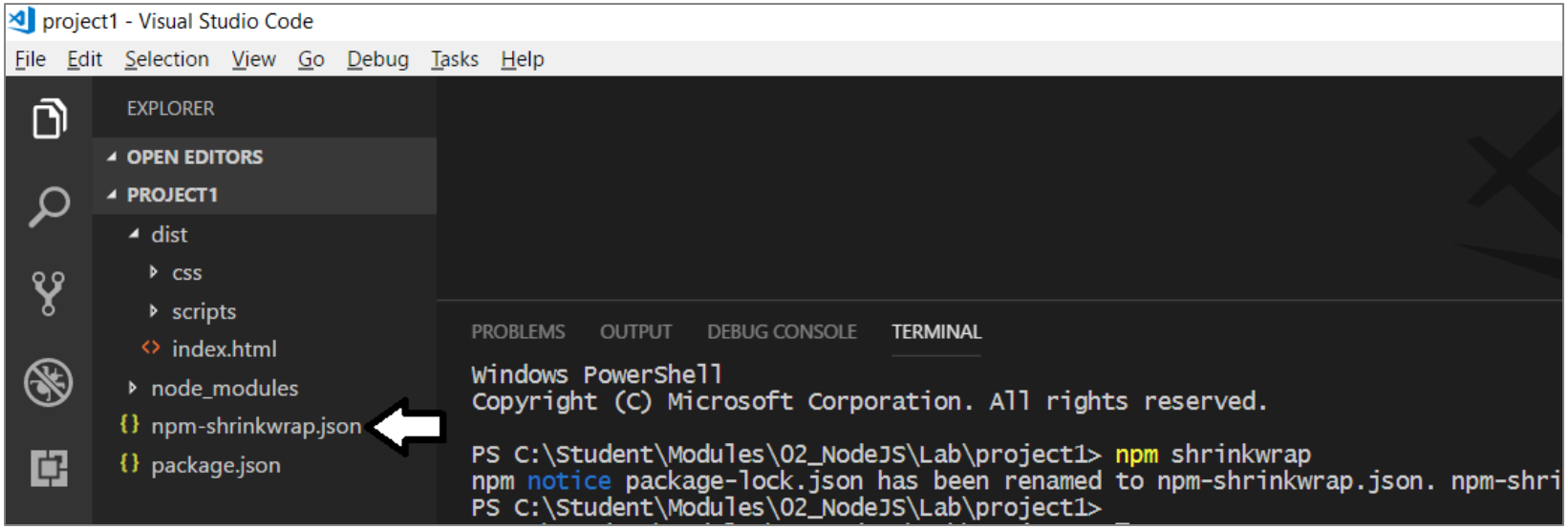
- Package files copied into **node_modules** folder
  - This folder often contain 100s of packages for a project
  - Contents of folder not saved into source control
  - Contents can be restored with **npm install** command



package.lock.json vs npm.shrinkwrap.json

- **npm** generates files to track changes to **node-modules**
  - **package.lock.json** file initially created when installing packages.
  - **package.lock.json** file should not be checked into source control

- Running **npm shrinkwrap** generates **npm.shrinkwrap.json**
  - **npm.shrinkwrap.json** file can be checked into source control



Project Install vs Global Install

- Project installation adds package into project folder
  - Packages installed without -g parameter

    `npm install [package_name] --save-dev`
  - **npx** command used to run CLIs from local **node_modules** folder

    `npx package_cli`

- Global installation adds into shared package cache
  - Packages installed with -g parameter

    `npm install -g [package_name]`
  - Package CLIs can be called directly from command line

    `package_cli`

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Configuring a Server-side Web Server

- Node.js does not provide its own web server
  - Instead, you must install a npm package to provide web server
  - There are many different packages to choose from

- Example packages which provide a web server for testing
  - http-server
  - express
  - Browser-sync *(this is the one we will be using)*

```
PS C:\Student\Modules\02_NodeJS\Lab\project1> npm install browser-sync --save-dev
npm notice created a lockfile as package-lock.json. You should commit this file.
npm WARN project1@1.0.0 No description
npm WARN project1@1.0.0 No repository field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.4 (node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.4: wanted {"os":"darwin","arch"
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.4: wanted {"os":"darw
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.4: wanted {"os":"darwin","arch"
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npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.4: wanted {"os":"darwin","arch"

+ browser-sync@2.24.6
added 222 packages in 23.346s
PS C:\Student\Modules\02_NodeJS\Lab\project1>
```
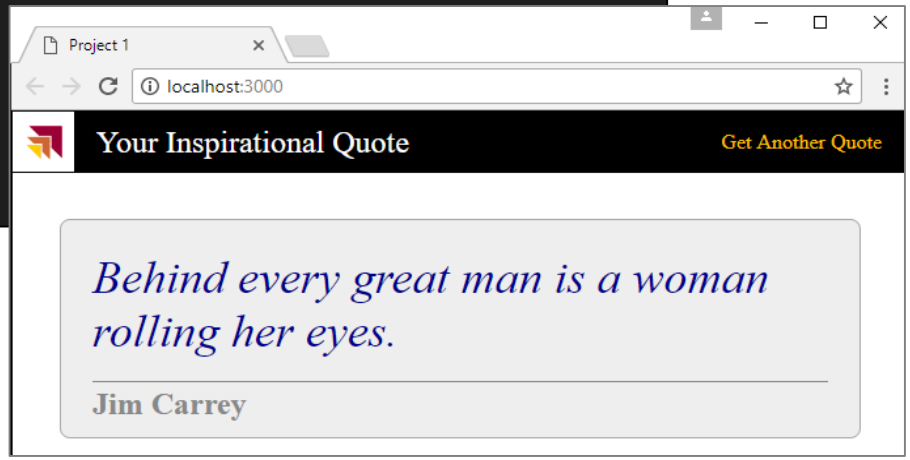

Using browser-sync to Serve Content

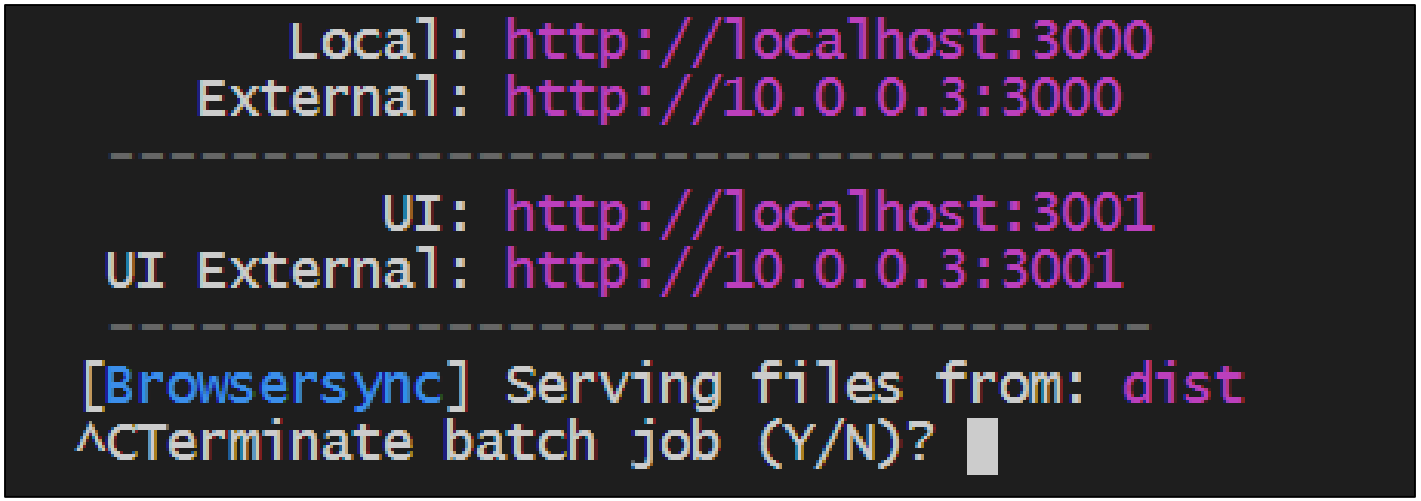
- **browser-sync start** command used to start web server
  - **--server** parameters references root folder with **index.html**

```
PS C:\Student\Modules\02_NodeJS\Lab\project1> browser-sync start --server dist
[Browsersync] Access URLs:
 ------------------------------------
       Local: http://localhost:3000
    External: http://10.0.0.3:3000
 ------------------------------------
          UI: http://localhost:3001
 UI External: http://10.0.0.3:3001
 ------------------------------------
[Browsersync] Serving files from: dist
```



Stopping the Web Server Session

- Type **CTRL + C** into console to interrupt session

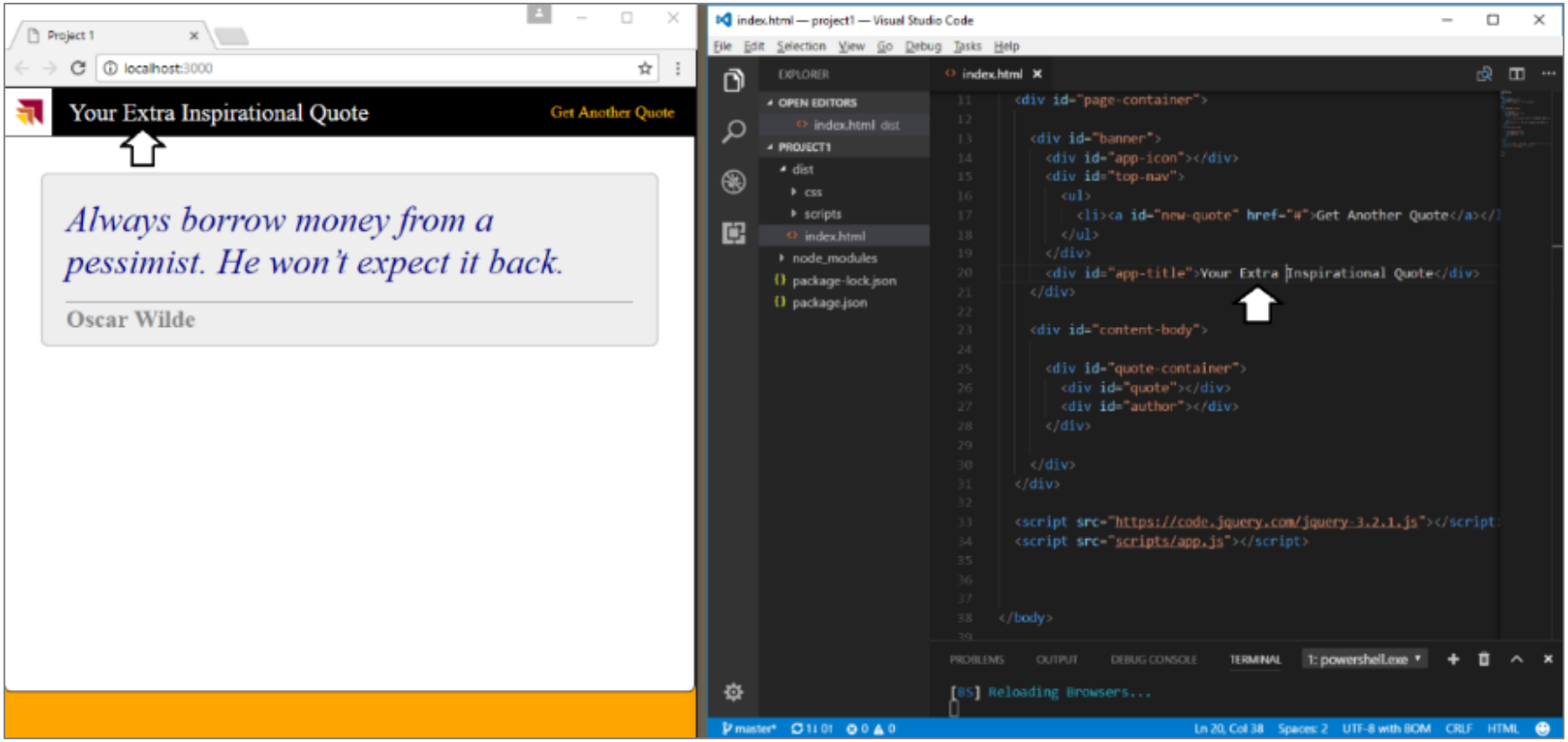


Starting Browser-sync with File Watching

- Browser-sync support **--files** parameter
  - browser-sync start --server dist --files dist

```
PS C:\Student\Modules\02_NodeJS\Lab\project1> browser-sync start --server dist --files dist
[Browsersync] Access URLs:
 ------------------------------------
       Local: http://localhost:3000
    External: http://10.0.0.3:3000
 ------------------------------------
          UI: http://localhost:3001
 UI External: http://10.0.0.3:3001
 ------------------------------------
[Browsersync] Serving files from: dist
[Browsersync] Watching files...
```

Automatic Updates



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Installing the TypeScript Package

- typescript package must be installed into project
  - Installed just like any other npm package

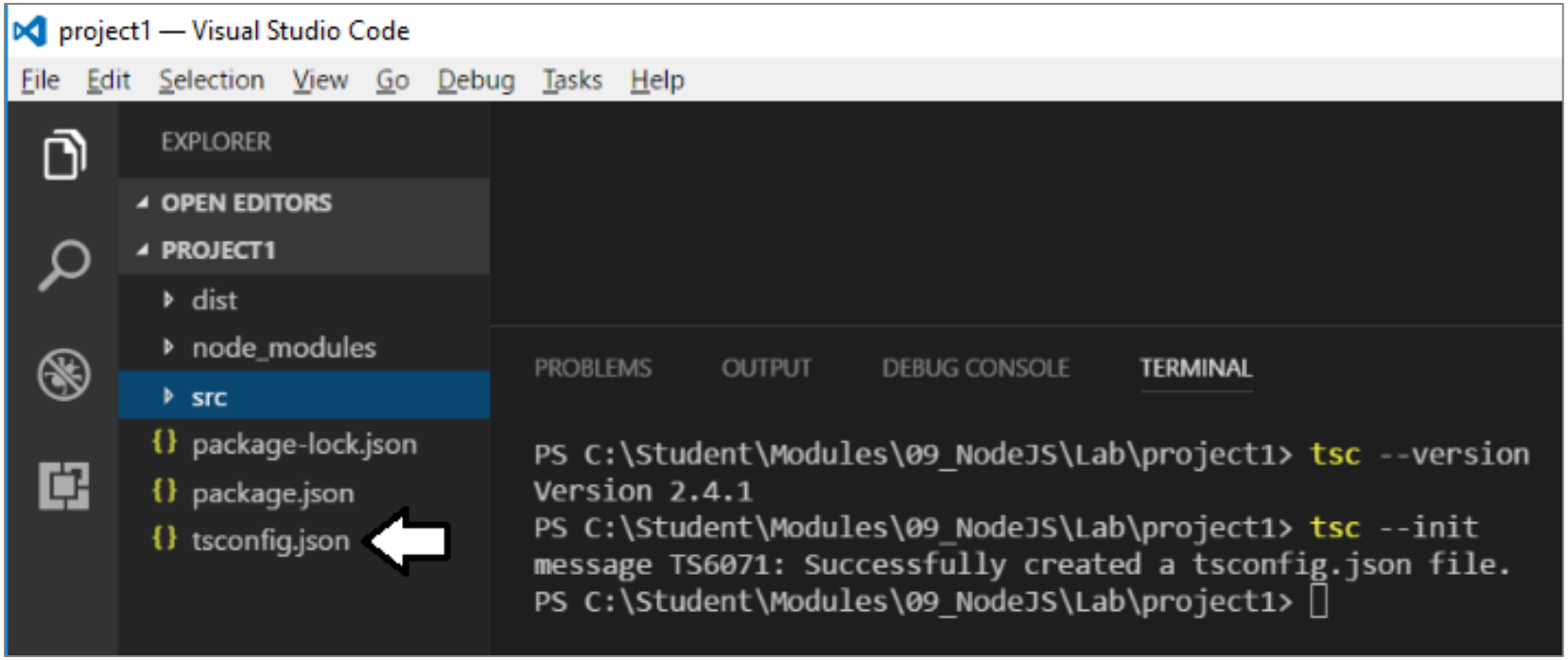
```
PS C:\Student\Modules\02_NodeJS\Lab\project1> npm install typescript --save-dev
npm WARN project1@1.0.0 No description
npm WARN project1@1.0.0 No repository field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.4 (node_modules\fsev
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1
64"})

+ typescript@3.0.1
added 1 package in 8.156s
PS C:\Student\Modules\02_NodeJS\Lab\project1>
```

- Take note of version number of typescript package
  - typescript version may vary from one project to another
  - Determine project-specific version using **npx tsc --version**

```
PS C:\Student\Modules\02_NodeJS\Lab\project1> npx tsc --version
npx: installed 1 in 3.79s
Path must be a string. Received undefined
C:\Student\Modules\02_NodeJS\Lab\project1\node_modules\typescript\bin\tsc
Version 3.0.1
PS C:\Student\Modules\02_NodeJS\Lab\project1>
```

Generating tsconfig.json

- Typescript compilation controlled using **tsconfig.json** file
  - Generated using **tsc --init** command



tsconfig.json

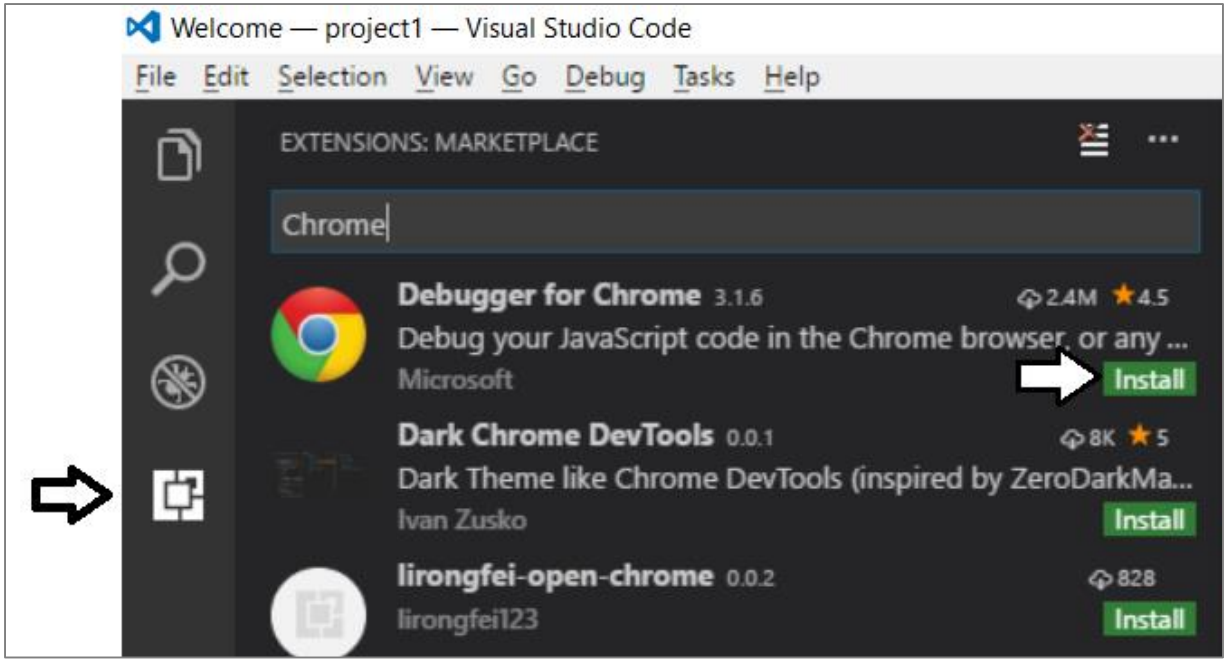
- Example of a **tsconfig.json** file

tsconfig.json

```
{
  "compilerOptions": {
    "noImplicitAny": true,
    "removeComments": true,
    "preserveConstEnums": true,
    "outFile": "./dist/scripts/app.js",
    "sourceMap": true,
    "lib": [
      "dom",
      "es6"
    ]
  },
  "files": [
    "./src/scripts/app.ts"
  ],
  "exclude": [
    "node_modules"
  ]
}
```

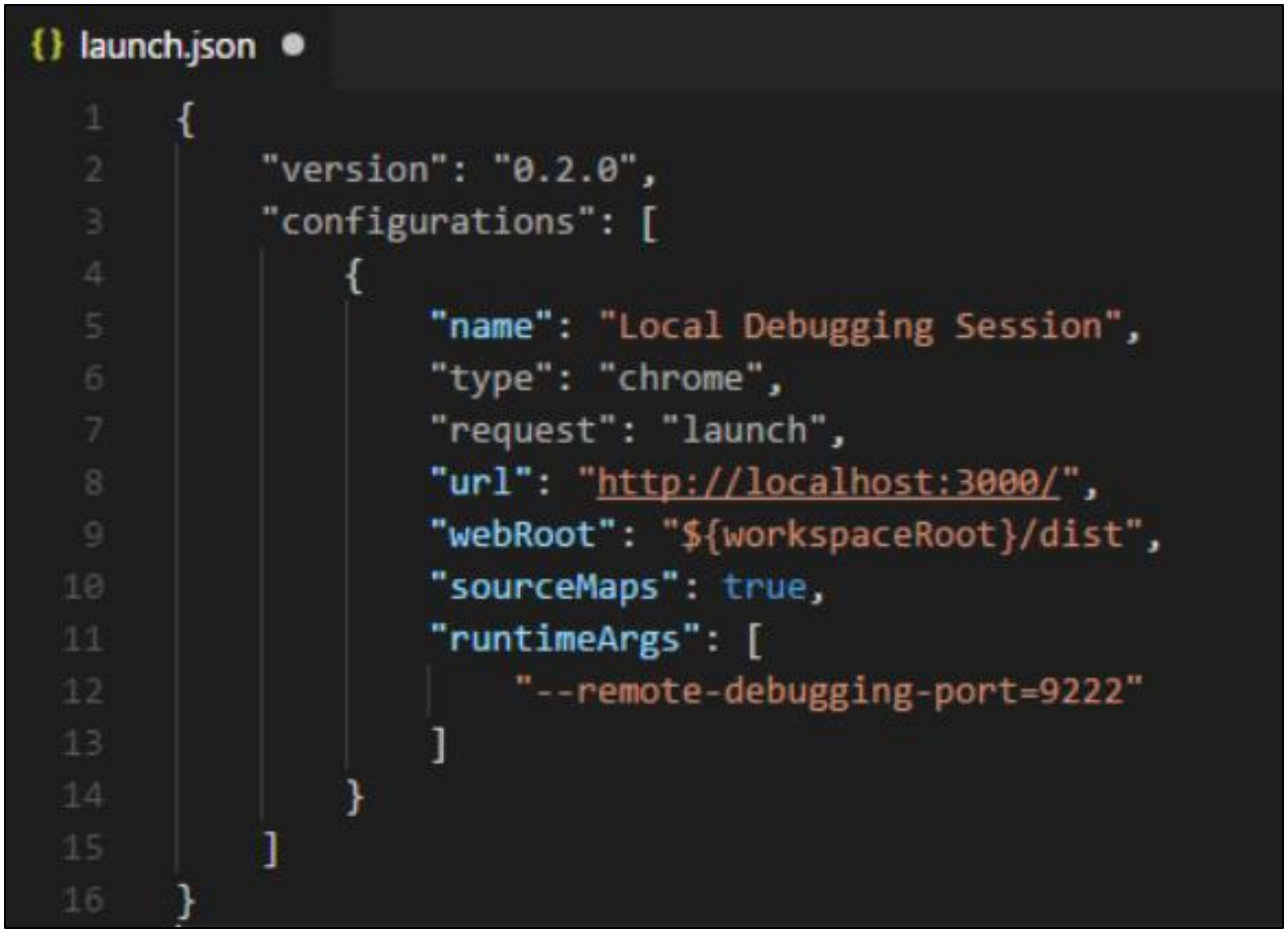
Chrome Debugging Support

- Visual Studio Code provides Chrome debugger extension
  - Provides ability to debug client-side Typescript code

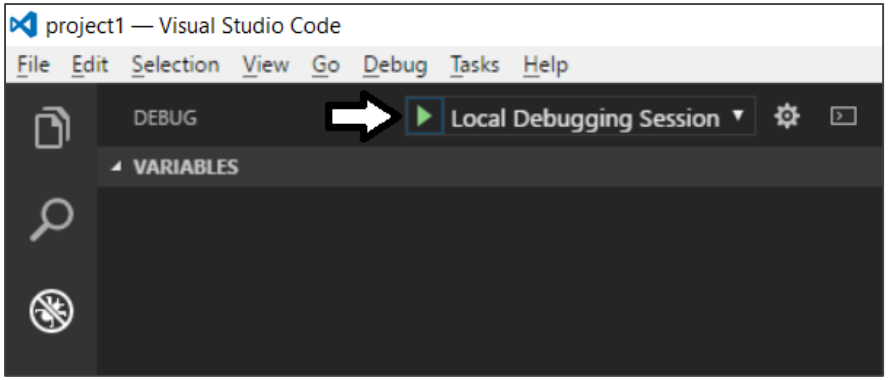


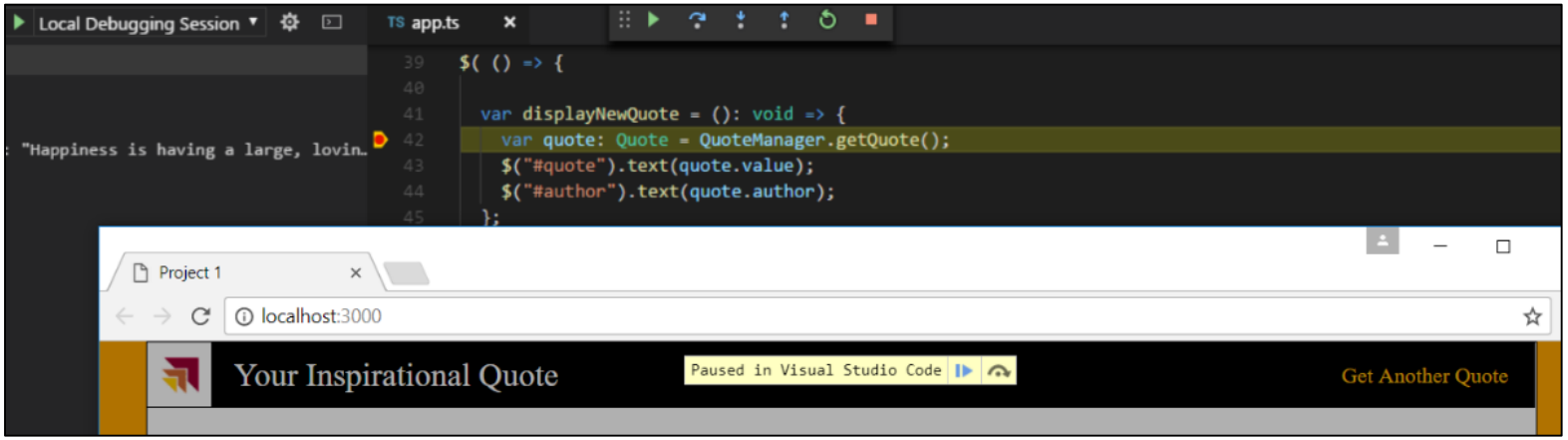
Visual Studio Debugging Support

- Debugging configurations tracked in launch.json



Running the Debugger





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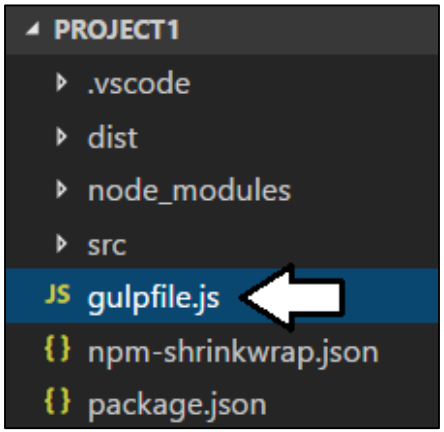
Gulp as a Task Runner

- Gulp serves as a Task Runner
  - Compiles TypeScript files to JavaScript
  - Compiles SASS files to CSS
  - Bundles and minifies JavaScript and CSS files

```
PS C:\Student\Modules\02_NodeJS\Lab\project1> npm install gulp --save-dev
npm WARN using --force I sure hope you know what you are doing.
npm WARN deprecated gulp-util@3.0.8: gulp-util is deprecated - replace it,
npm WARN deprecated graceful-fs@3.0.11: please upgrade to graceful-fs 4 fo
npm WARN deprecated minimatch@2.0.10: Please update to minimatch 3.0.2 or
npm WARN deprecated minimatch@0.2.14: Please update to minimatch 3.0.2 or
npm WARN deprecated graceful-fs@1.2.3: please upgrade to graceful-fs 4 for

> fsevents@1.2.4 install C:\Student\Modules\02_NodeJS\Lab\project1\node_mo
> node install

npm WARN project1@1.0.0 No description
npm WARN project1@1.0.0 No repository field.

+ gulp@3.9.1
added 75 packages in 6.404s
PS C:\Student\Modules\02_NodeJS\Lab\project1>
```

gulpfile.js

- Gulp tasks are programmed inside **gulpfile.js**
  - **Gulpfile.js** must be added to root of project



gulpfile.js

```
var gulp = require('gulp');
var clean = require('gulp-clean');
var ts = require("gulp-typescript");
var tsProject = ts.createProject("tsconfig.json");
var sourcemaps = require('gulp-sourcemaps');
var browserSync = require('browser-sync');


gulp.task('clean', function () {
  console.log("Running clean task");
  return gulp.src('dist/', { read: false })
    .pipe(clean());
});

gulp.task('build', ['clean'], function () {
  console.log("Running build task");

  gulp.src('src/**/*.html').pipe(gulp.dest('dist'));
  gulp.src('src/css/**/*.css').pipe(gulp.dest('dist/css'));
  gulp.src('src/css/img/**/*.png').pipe(gulp.dest('dist/css/img'));

  return tsProject.src()
    .pipe(sourcemaps.init())
    .pipe(tsProject())
    .pipe(sourcemaps.write('.', { sourceRoot: './', includeContent: false }))
    .pipe(gulp.dest("."));

});
```

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WebPack

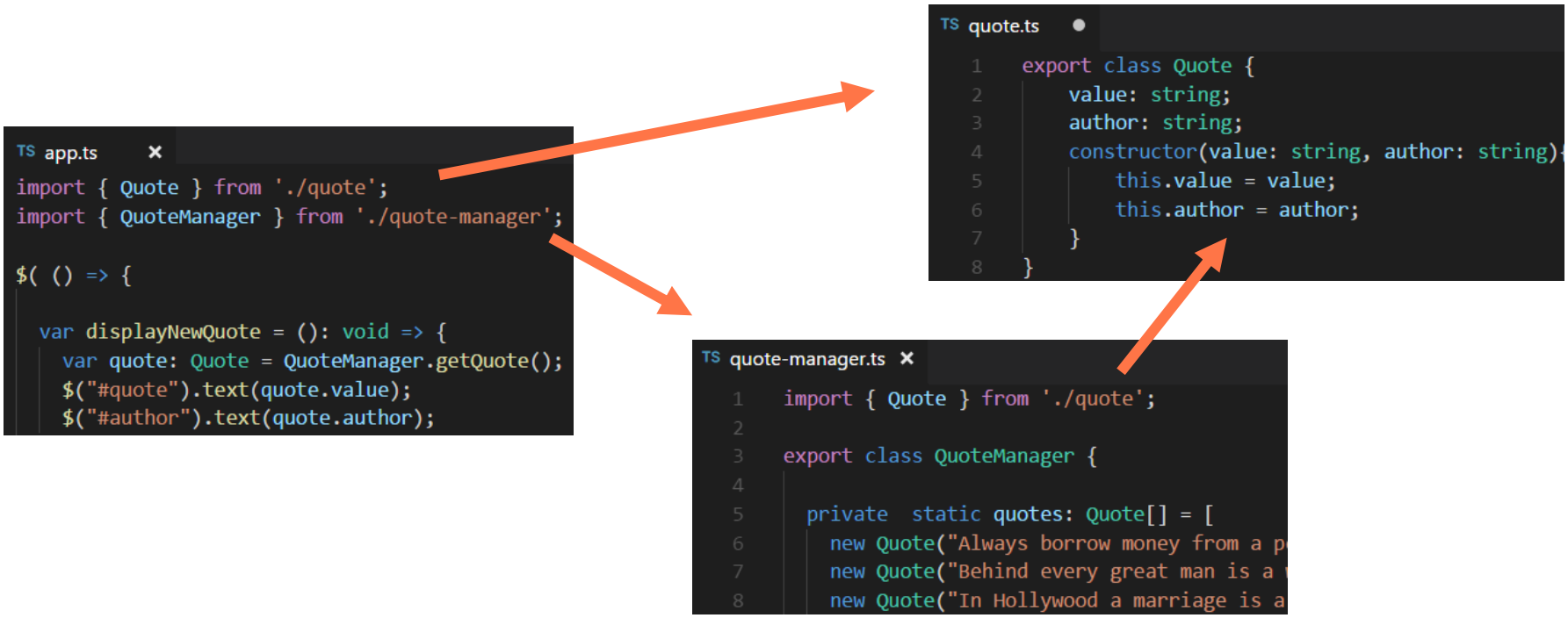
- WebPack serves as a bundling utility
  - Bundles many js/ts files into a single file
  - Can handle dynamic module loading
  - Provides a dev server for testing and debugging

- When using Webpack 4
  - Install packages for webpack and webpack-cli

```
npm install webpack webpack-cli --save-dev
```

Dynamic Module Loading

- Webpack controls dynamic module loading
  - Your project just references app.ts
  - Compiler dynamically determines other files to include



Webpack Loaders

- Loaders do two things
  - Identify which file or files should be transformed
  - Transform files and ad them to dependency graph

- Example loaders
  - awesome-typescript-loader
  - style-loader
  - css-loader
  - url-loader

Webpack Plugins

- Webpack supports plugins in addition to loaders
  - commonly used to perform actions and custom functionality
  - Plugins act upon compilations or chunks of your bundled modules

- Examples Plugins
  - clean-webpack-plugin
  - copy-webpack-plugin
  - html-webpack-plugin

webpack.config.js

- Build process controlled through **webpack.config.js**

webpack.config.js

```
const path = require('path');

const HtmlWebpackPlugin = require('html-webpack-plugin');
const CopyWebpackPlugin = require('copy-webpack-plugin');
const CleanWebpackPlugin = require('clean-webpack-plugin')

module.exports = {
  entry: './src/scripts/app.ts',
  output: {
    filename: 'scripts/bundle.js',
    path: path.resolve(__dirname, 'dist'),
  },
  resolve: {
    extensions: ['.js', '.ts']
  },
  plugins: [
    new CleanWebpackPlugin(['dist']),
    new HtmlWebpackPlugin({ template: path.join(__dirname, 'src', 'index.html') }),
    new CopyWebpackPlugin([{ from: './src/favicon.ico', to: 'favicon.ico' }])
  ],
  module: {
    rules: [
      { test: /\.(ts)$/, loader: 'awesome-typescript-loader' },
      { test: /\.css$/, use: ['style-loader', 'css-loader'] },
      { test: /\.(png|jpg|gif)$/, use: [{ loader: 'url-loader', options: { limit: 8192 } }] }
    ],
  },
  mode: "development",
  devtool: 'source-map'
};
```

WebPack Builds

- Running build process generates files for distribution

```
PS C:\Student\Modules\02_NodeJS\Lab\project2> npm run build

> project2@1.0.0 build C:\Student\Modules\02_NodeJS\Lab\project2
> webpack

clean-webpack-plugin: C:\Student\Modules\02_NodeJS\Lab\project2\dist has been removed.
i |atl|: Using typescript@3.0.1 from typescript
i |atl|: Using tsconfig.json from C:/Student/Modules/02_NodeJS/Lab/project2/tsconfig.json
i |atl|: Checking started in a separate process...
i |atl|: Time: 595ms
Hash: 9bd924fdc1391178039d
Version: webpack 4.16.4
Time: 5486ms
Built at: 2018-08-02 16:29:28
            Asset       Size  Chunks             Chunk Names
scripts/bundle.js    839 KiB    main  [emitted]  main
       index.html  714 bytes          [emitted]
      favicon.ico   1.12 KiB          [emitted]
Entrypoint main = scripts/bundle.js
[./node_modules/css-loader/index.js!./src/css/app.css] ./node_modules/css-loader!./src/css/app.css 1.89 KiB {main} [built]
[./src/css/app.css] 1.05 KiB {main} [built]
[./src/css/img/AppIcon.png] 981 bytes {main} [built]
[./src/scripts/app.ts] 505 bytes {main} [built]
[./src/scripts/quote-manager.ts] 2.38 KiB {main} [built]
[./src/scripts/quote.ts] 275 bytes {main} [built]
    + 5 hidden modules
Child html-webpack-plugin for "index.html":
     1 asset
    Entrypoint undefined = index.html
    [./node_modules/html-webpack-plugin/lib/loader.js!./src/index.html] 880 bytes {0} [built]
    [./node_modules/webpack/buildin/global.js] (webpack)/buildin/global.js 509 bytes {0} [built]
    [./node_modules/webpack/buildin/module.js] (webpack)/buildin/module.js 519 bytes {0} [built]
        + 1 hidden module
PS C:\Student\Modules\02_NodeJS\Lab\project2>
```

Webpack Dev Server

- Webpack provides its own development server
  - Install the webpack dev server package

    ```
    npm install webpack-dev-server --save-dev
    ```
  - Run your project using the webpack dev server CLI

    ```
    webpack-dev-server --open
    ```

Summary

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