Google Summer of Code 2025 Proposal

Personal Information

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Program: Google Summer of Code 2025
Organization: Webpack
Project Title: Tooling: Unified Webpack Dev Tools
Project Size: Medium (175 hours)
Mentors: Alexander, Nitin

Synopsis

Webpack currently utilizes three different packages to provide development tooling: `webpack-dev-server`, `webpack-dev-middleware`, and `webpack-hot-middleware`. This fragmentation leads to duplicated logic, inconsistent maintenance, and confusion for developers. The aim of this project is to **unify** these into a modular and cohesive structure, centered around a new core package `webpack-hmr-middleware`, making development with Webpack easier, more consistent, and modern.

This new middleware package will abstract the hot-reload logic from `webpack-dev-server`, integrate improvements from `webpack-hot-middleware`, and ultimately simplify the dev tooling landscape for Webpack users.

Benefits to the Community

- **Modularity:** Centralizing logic reduces duplication and simplifies maintenance.
- **Consistency:** Developers no longer need to worry about which dev middleware to choose.

- **Improved Developer Experience:** Better DX through a cleaner API and more predictable behavior.

- **Forward Compatibility:** Sets the foundation for future improvements and ESM support.

Deliverables

1. **`webpack-hmr-middleware`** – a new package that handles all hot module replacement (HMR) logic.

2. **Refactor `webpack-dev-server`** – extract hot/client logic and integrate with the new HMR middleware.

3. **Migrate `webpack-hot-middleware` logic** – port relevant parts to `webpack-hmr-middleware` and deprecate old package.

4. **Monorepo setup** – structure the dev tooling as a monorepo with three main packages.

5. **Documentation** – update official Webpack docs to reflect the new tooling structure.

6. **Tests & Demos** – add integration and unit tests, and example configurations.

Technical Approach

1. Create `webpack-hmr-middleware`

This package will handle HMR and client logic that currently exists in both `webpack-dev-server` and `webpack-hot-middleware`.

Key Features:

- WebSocket integration

- Client-side updates
- Hot reload lifecycle hooks
- Compatibility with both Express and WebpackDevServer

Example Skeleton:

```
const hmrMiddleware = (compiler, options = {}) => {
  return (req, res, next) => {
    // HMR logic here
    next();
  };
};
```

2. Refactor `webpack-dev-server`

- Remove duplicated HMR/client logic.
- Use `webpack-hmr-middleware` internally.
- Enable better custom server integration.

3. Deprecate `webpack-hot-middleware`

- Migrate useful logic.
- Add deprecation notice in README.

4. Setup Monorepo

Use tools like `pnpm workspaces` or `TurboRepo`:

```
/packages
  /webpack-dev-server
```

/webpack-dev-middleware

/webpack-hmr-middleware

5. Testing & Demos

- Unit tests for middleware behavior.
- Integration tests with Webpack + Express.
- Example project using the new setup.

Timeline

Community Bonding (May 20 - June 16)

- Interact with the community and mentors.
- Finalize tech stack, monorepo tooling, and milestones.
- Study source code of current dev tooling.

Phase 1 (June 17 - July 15)

- Build base version of `webpack-hmr-middleware`.
- Integrate with `webpack-dev-server`.
- Set up monorepo structure.
- **Deliverable:** Working prototype and monorepo setup.

Phase 2 (July 16 - August 12)

- Migrate logic from `webpack-hot-middleware`.
- Add tests and improve error handling.
- Update internal Webpack docs.
- **Deliverable:** Feature-complete middleware and updated `webpack-dev-server`.

Final Weeks (August 13 - August 18)

- Polish code, finalize documentation.
- Prepare blog post and contribution guide.
- **Deliverable:** Final merged PRs and mentor-approved project.

About Me

I am Shubhanshu Kumar, a final-year B.Tech student and an enthusiastic open-source contributor. I love working with backend systems and development tools, and I have prior experience building real-time applications and working with Node.js.

Skills:

- **Languages:** JavaScript, TypeScript, HTML, CSS
- **Frameworks:** Express.js, Webpack, React, Node.js
- **Tools:** Git, GitHub, VSCode, Postman
- **Soft Skills:** Team collaboration, documentation, problem-solving

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Why Me?

I have actively contributed to large-scale backend projects and understand the significance of modular tooling. My interest in dev tooling, combined with my backend development experience, makes me an ideal candidate for this project. I'm a quick learner, passionate about writing clean and maintainable code, and eager to contribute meaningfully to the Webpack community.

Contributions So Far

I have studied and experimented with Webpack's core architecture and dev tooling packages. I also created minimal clones of the current middleware packages to understand their flow and dependencies, which helped me prepare for this proposal. I plan to submit my first PR during the bonding period.

Future Plans

Beyond GSoC, I plan to:

- Actively maintain and improve Webpack tooling.
- Help newcomers contribute to Webpack.
- Write guides and documentation for better adoption.

Final Deliverables

- `webpack-hmr-middleware` package published
- Refactored `webpack-dev-server` and `webpack-dev-middleware`
- All tests and examples completed
- Documentation and migration guides published

- Blog post and demo project

Thank You

Thank you for reviewing my proposal. I’m truly excited about the opportunity to work with Webpack and contribute to the JavaScript ecosystem!