

Semantic Versioning



Mike DiDomizio, June 2024

What is Semantic Versioning (SemVer)?

- A versioning system that follows the format MAJOR.MINOR.PATCH ex. 2.3.3.
- Commonly used by packages in dependency management systems like NPM, Maven, Homebrew
- Visually details the type of change between versions.
 - **MAJOR**: Breaking changes - 1.2.0 => 2.0.0
 - **MINOR**: New features, backward-compatible => 1.0.0 => 1.1.0
 - **PATCH**: Bug fixes, backward-compatible => 1.0.0 => 1.0.1

Why is versioning important?

- Tracking changes over time
- Managing dependencies
- Communicating changes
- Enables rollbacks
- Provides legal and compliance tracking

Major changes

- Generally existing APIs have been changed from how they previously worked. For example, instead of accepting a string value, it now expects a number
- Means that upgrading the version could mean updates are necessary in your code
- Examples:
 - `POST /api/sport { "sport": 2 }` => `POST /api/sport { "sport": "hockey" }`
 - UI components `
- Can include new features, bug fixes
- Resets the **MINOR** and **PATCH** version - 4.6.3 => 5.0.0



```
- function getSport(sport: number) {  
+ function getSport(sport: string) {  
}
```

Minor changes

- Generally means a new feature or functionality that is backwards compatible
- Examples:
 - Adding a new API endpoint
`GET /api/sports`
 - Creating a new UI component
 - Adding new functionality to an existing component
- Resets the **PATCH** version - 4.8.3 => 4.9.0

```
- function getSport(sport) {  
+ function getSport(sport, format) {  
+   if (format === 'json') {  
+     return formattedData  
+   }  
  
  return nonFormattedData  
}
```

Patch changes

- Adds a fix/change to existing functionality. Fixing logic that throws errors when it was not supposed to.
- Increments to next number - 4.6.2 => 4.6.3
- Patch changes or bug fixes, can be applied to multiple different versions, but it is not a requirement.

ex. 4.6.2 => 4.6.3

4.5.8 => 4.5.9



```
function getSport(sport) {  
- if (sport === 'hcokey') {  
+ if (sport === 'hockey') {  
  }  
}
```

Prerelease versioning and build metadata

- Used to denote `alpha`, `beta`, `canary`, `release candidate` builds
versions
major.minor.patch+buildMetadata (e.g., 1.0.0+202406091000).
major.minor.patch-rc.1
- Prerelease versioning indicates the progression of development and testing before a final release, affecting the version's position in the release cycle.
- Use build metadata for identifying specific builds, without affecting version precedence. Useful for internal tracking or CI/CD processes.
- Not a requirement to use

Best Practices

- Take the versioning out of people's hands with tools like ChangeSets.
 - Less chance of making mistakes - 2.3.4 => 2.3.6 oops forgot 2.3.5
- Shouldn't unpublished packages or versions, or overwrite versions
 - Ensures consistency
 - Unpublishing can cause rippling effects - NPM history of left-pad. With NPM this can no longer be done (for most circumstances).
 - Can deprecate a version that you no longer want people to use.
 - In NPM, this will output a message on install that a package is deprecated
- CHANGELOG can be helpful to tell users what a release contains

Common pitfalls

- Inconsistent versioning practices
Example: Devs not versioning things properly - minor for bug fixes, patch for new functionality. It can lead to confusion on what the new version contains. Can be dangerous to users, cause confusion or distrust.
- Misuse of **MAJOR** version changes. Using **MAJOR** for everything. Hard to understand how drastically something has changed between versions. Can cause hesitancy for users to upgrade, lack of new version adoption due to always being a major version change.
- Lots of **MAJOR** version changes - Can cause exhaustion for users keeping up with changes, distrust, be a sign of poor planning. A user may choose a package that has consistency and stability over one that frequently has breaking changes.
- Lack of information in CHANGELOG - Can cause hesitancy of adoption if the user doesn't know what is changing.

Common misconceptions

- Anything less than version 1 is unusable ex. 0.1.0
 - Generally used to tell users “This is probably unstable, and may be changing”, initial alpha/beta version.
 - Common to start with 1.0.0 as it is the “first version”, but there is no hard rule.
- All changes require a version bump - you simply don't have to publish on every change. You can choose to group changes into one release.
- **PATCH** changes are only for fixing bugs - can be for publishing improvements to documentation, or refactoring/optimizations.
- Numbers cannot go above 10 - When you get to 2.4.9, the next change is not necessarily 2.5.0. A fix version bump would be 2.4.10.
- A **MINOR** or **PATCH** version guarantees backwards compatibility. Versioning is still handled by humans, and people make mistakes. Sometimes bug fixes introduce other bugs that were not intended.

Common alternatives to Semantic Versioning

- CalVer - uses the calendar date as the version number. Easy to understand when a version was released.
 - Example: 2024.06.1 (June 1, 2024), 23.1.15 (January 15, 2023).
- MAJOR.MINOR
 - Example: 2.5 (Major version 2, Minor version 5).
 - Less granular than SemVer
- Rolling version - Uses a continuous, incrementing number, often without major/minor differentiation.
 - Example: build-1234, revision-5678.

Other uses for versioning

- Documentation and publications (notes, documents, books)
- Public APIs (GitHub)
- Business processes and policies
- Hardware
- Online Courses

You can version anything really!

MAJOR.MINOR.PATCH recap

- **MAJOR** - Something has changed that is no longer backwards compatible, upgrading may break my product.
- **MINOR** - A new separate functionality has been added. Should not be a problem to upgrade.
- **PATCH** - This is a fix so no new functionality has been added, but something has been changed. Should not be a problem to upgrade.

Versioning gone mad

Because why not

- Xbox, Xbox 360, Xbox One, Xbox One S, Xbox One X, Xbox Series X, Xbox Series S.
- Windows 3.1, Windows 95, Windows 98, Windows XP, Windows 2000, Windows ME, Windows Vista, Windows 7, Windows 8, Windows 8.1, Windows 10
- Battlefield 1942, Battlefield 2, Battlefield 1943, Battlefield 3, Battlefield 4, Battlefield 2142, Battlefield 1, Battlefield V, Battlefield 2042
- Modern Warfare 2 (2009), Modern Warfare 2 (2020)

Having inconsistent versioning can make things hard for people to understand.

Conclusion

Versioning software is a fundamental practice in software development that ensures clarity, reliability, and efficiency in managing software lifecycle processes. It provides a structured way to handle updates, communicate changes, and maintain compatibility, significantly contributing to the overall success of software projects.

Thanks for reading this!

Let me know if you have any feedback

- Other than this presentation, maybe the only resource needed for detailed information on Semantic Versioning.
- There is a 12 question quiz 🙄. It should take a few minutes to go through and it is anonymous. Validate what you've learned!



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