

SOLIT MANTRA: Visualizing Popular Library Combinations based on Wisdom of the Crowd.

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In recent years, the adoption of third-party libraries is the dominant practice in software development. With a promise of quality and stability of the code, libraries offer an effective and efficient mean for software reuse in software development. Over time, both the system using the libraries and the libraries themselves, evolve and change. Keeping the libraries up to date, could potentially improve performance and reduce costs, but can be a challenging task or cause dependency issues. Library developers preferably want to keep their product up to date with new trends, therefore they constantly change and adapt the library, integrating old methods with the existing code or adding new features. The newer versions of a library provide bug fixes, optimizations and introduce new functionalities. Updating libraries can quickly become a complex task within large systems, especially when they are composed of many libraries and some may be incompatible with each other.

In this paper, we propose an interactive visualization called Software Library Tranquility Mantra (SOLIT Mantra) to aid and assist software maintainers with the complex task of maintaining a system. Using the 'wisdom of the crowd', we propose a 'co-usage' metric that calculates the likelihood of similar systems using the same combination of libraries. Therefore, we use the co-usage to recommend to developers which sets of libraries should be updated together.

The SOLIT Mantra visualization uses an orbital layout and planetary metaphor with motion animation to depict an intuitive method to easily identify 1). Libraries that are in need of an update and 2). the recommended sets of libraries that may be updated together. In detail,

we represent the system in our visual prototype as planets (libraries), a core (the system) and with their satellites (co-usage libraries) that are in orbit with each other. The size of the orbit and rotation direction, depict the size of co-usage and whether the library is outdated and in need of an update. Our visualization should be able to handle large systems with many library dependencies.

In our prototype, we show different cases of real-world systems to evaluate the intuitive and scalability of our visualization. We plan to evaluate SOLIT Mantra, through cognitive experiments and feedbacks conducted on both researchers and practitioners. Our end goal is to assist library maintainers, especially novices to the project, understand the complexities of their system library dependencies.