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modular

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About the Modularity Patterns

Module frameworks are gaining traction on the Java platform. Though modularity isn't a new concept, it promises to change the way we develop software applications. You'll only be able to realize the benefits of modularity if you understand how to design more modular software systems.

The modularity patterns lay the foundation necessary to incorporate modular design thinking into your development initiatives. No module framework is necessary to use these patterns, and you already have many of the tools you need to design modular software. This refcard provides a quick reference to the 18 modularity patterns discussed in the book Java Application Architecture: Modularity Patterns with Examples Using OSGi.

The modularity patterns are not specific to the Java platform. They can be applied on any platform by treating the unit of release and deployment as the module. Each pattern includes a diagram (except for base patterns), description, and implementation guidance.

Base Patterns: Fundamental modular design concepts upon which several other patterns exist.

Dependency Patterns: Used to help you manage dependencies between modules.

Usability Patterns: Used to help you design modules that are easy to use.

Extensibility Patterns: Used to help you design flexible modules that you can extend with new functionality.

Utility Patterns: Used as tools to aid modular development.

Modular Isn't New, But Its Benefits Are

Most advocates for offsite modular construction are quick to point out that the idea isn't new. Yet, what is new is the investment and the technology capabilities that are making modular construction a better possibility with much improved results.

What are those results?

McKinsey & Company released a report in June that shows that modular construction can speed construction by as much as 50%. The research says that in some cases it could also cut costs by up to 20%. It projects that modular construction could claim $130 billion of the market in US and Europe by 2030 and fill a $1.6 trillion productivity gap.

With that kind of data, it's no wonder that so many groups are focused on it. New modular construction companies are attacking both labor and affordability challenges full steam.
The controlled factory environment that modular uses is also helping companies achieve higher sustainability and resiliency standards.

In this episode of the HIVE Re:Think podcast, host Philip Beere, speaks with Chris Krager, founder and principal at KRDB and founding principal at Ma Modular. Krager saw the evolution of opportunity for modular construction as an architect and started his firm Ma Modular. In this podcast he shares his history and his success.

4 Stunning Examples of Modern Modular Architecture

Video credit: Wall Street Journal

Modular design and off-site construction in both the residential and commercial markets has expanded architectural possibilities, bringing the benefits of lower cost, faster build times and sustainability. The modular construction process enables collaboration and customization from the design stage through to the on-site build, helping to achieve both the architect's vision and the owner's goals.

As more architects, builders and owners begin to explore and embrace modular construction and the creative possibilities it offers, stunning new designs are gracing the skylines. From modular multi-residential buildings, schools and student housing to healthcare buildings, corporate offices and industrial facilities that are built off site, modular projects across the country and around the world are pushing the limits of architectural design. Here are four of the best examples of the union of modern architecture and modular construction.

Reflection of Mineral – Tokyo

In Tokyo, space is at a premium, which makes the country the perfect place for both the "tiny house" movement and modular construction to take hold. Reflection of Mineral is a 480-square foot home that was designed by architect Yasuhiro Yamashita and has won numerous architecture and design awards. The whimsy and charm of the exterior design and elegant interior is the perfect expression of Japanese minimalism. Reflection of Mineral is an excellent example of how an architect can use modular construction to fit the tight space requirements of downtown Tokyo while maintaining a sense of cutting edge design.

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Mini Sky City – Hunan Province, China

China has embraced modular construction as a means to grow the country's infrastructure quickly and efficiently. In an unheard-of development, the Chinese firm Broad Sustainable Building recently erected a 57-storey, modern skyscraper in just 19 days. The steel and glass tower was put up at the rate of three floors per day. The mixed-use building has 18 atriums, 800 apartment units, substantial office space and is constructed of 2736 individual modules that took four months to assemble off site. The company responsible has lofty goals: it plans to erect a 220-storey skyscraper in central China called Sky City that will be the world's tallest building.

Like Tokyo, in Manhattan space is at a premium. My Micro NY is the city's first micro-apartment building and, consisting completely of modular units, was one of the first multi-unit Manhattan buildings to use off-site construction. At nine stories tall and 35,000 square feet total space, the building features 55 modular units (each one is 250 to 370 square feet) that were built completely off site, trucked to the city and craned into place. Made of steel frames and concrete slabs, each "apartment" is pre-wired and plumbed, brought to the site, placed, bolted and tied into the building systems. The building features a gym, lounge, roof terrace and garden. Built by nARCHITECTS with Monadnock Development, the proposal won the NYC Department of Housing Preservation and Development's adAPT NYC competition, which was created to meet the needs of New York City's growing demographic of one- and two-person households.

Pier 57 – A modular shipping container mall in New York City

Cargo containers are a natural (albeit sometimes controversial) option when it comes to cost-effective modular design. One project currently being developed by Youngwoo & Associates and designed by Handel Architects and !Melk Landscape Architect and Urban Design takes modular cargo container construction to the next level. Historic Pier 57 in New York is about to undergo conversion into an extensive modular shipping container mall on the water. The project, which will include Anthony Bourdain's "food hall" and Google's offices, will use cargo containers prefabricated and plugged into the existing structure to be used as retail space. Restaurants, a theatre, observation decks and a 14,000 square foot green roof are also planned.

Modular construction is changing the urban landscape, and allowing architects to create ever more daring, functional and sustainable designs. From space limitations to building efficiencies, modular construction allows designers and builders to create stunning visual additions to cities faster than ever before. These four examples are just a small sample of what's possible when high design is combined with the efficiency and sustainability of modular construction.