FUTURE-PROOF SOFTWARE-SYSTEMS

Lecture Winter Term 2019/20

Prof. Dr. Frank J. Furrer

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Introduction

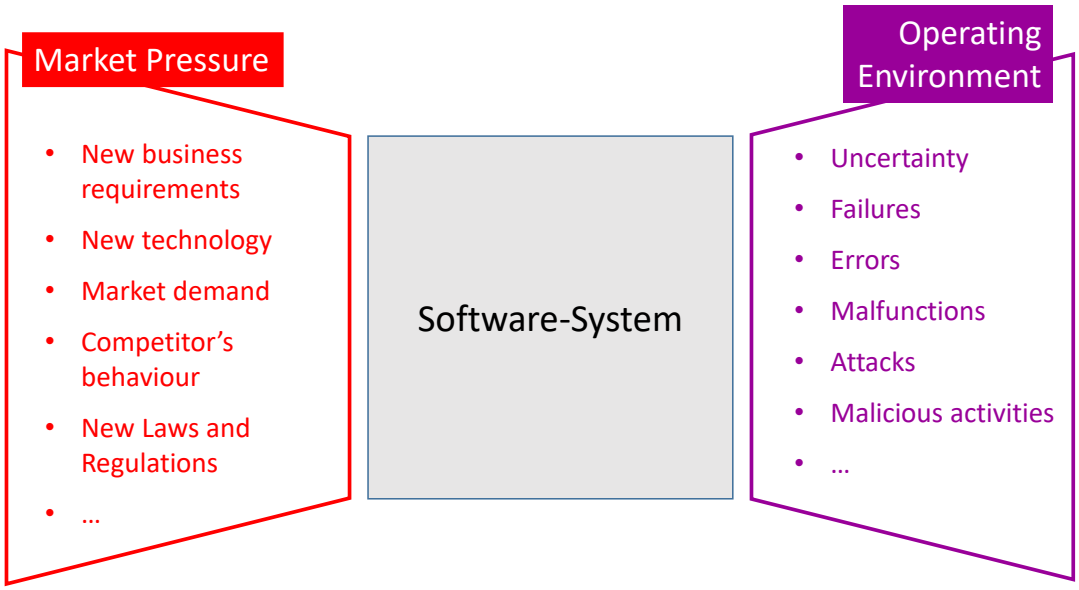
Today we live in a ***software-world***. Most of our products and services are based on software. Our dependence on software is nearly total.

This lecture focusses on a specific type of software: Mission-critical, business-essential and long-lived software. ***Mission-critical*** means that a malfunction or unavailability of the software inhibits the use of the product or service and may cause damage, accidents or even loss of live. ***Business-essential*** implies that the software is key to the success and development of a company or organization. Finally, ***long-lived*** signifies that the software-system must be maintained, extended and evolved over many years, possibly decades.

Mission-critical, business-essential and long-lived software is essential for a very broad range of either ***enterprise applications***, such as banking, insurance, energy distribution, mobile communications etc. or of ***cyber-physical systems applications***, such as autonomous cars and aeroplanes, heart-pacemakers,

production or operating robots, and many more. Our world cannot function properly without this type of ***software-systems***.

Context



A modern software-system lives in the tension field of ***market pressure*** and of an (often hostile or uncertain) ***operating environment***. Market pressure forces the relentless adaptation of the software-system to new requirements. Here, the speed of adaptation is often decisive for the success of a product or service. The impact of the operating environment requires a resilient and dependable software-system to survive unforeseen or dangerous situations.

The objective of future-proof software-systems is to generate business value and continuously improve both ***changeability*** and ***dependability***. The property "changeability" assures that the software-system can be adapted in time to respond to business requirements. The property "dependability" enables the software-system to operate reliably even in hostile or adverse condition.

Software Architecture

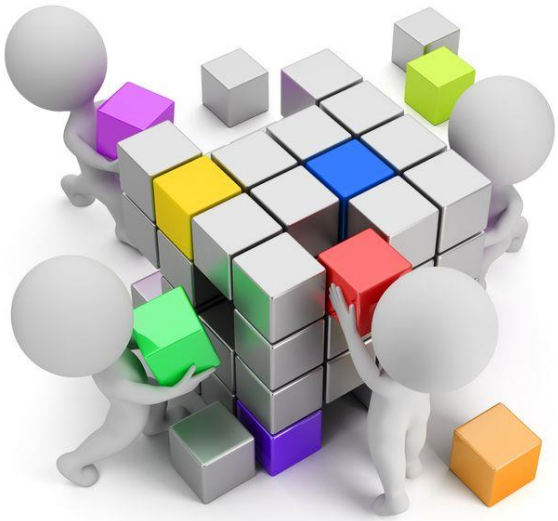
Future-proofness of software is the result of its ***architecture***. Only a well-defined, adequate, and consistently evolving architecture assures the necessary functional and non-functional properties. Fortunately, systems architecture has matured from a "black art" to a well-founded system engineering discipline today. Architecture is

taught and implemented using ***architecture principles***. This lecture focuses on the important architecture principles for future-proof software, presenting an architect's toolbox, focused on ***changeability*** and ***dependability*** of software-systems.

Software Engineering

Software – and the ability to produce software – has become a key competitive factor in most industries. The fundamental quality properties: Business value, changeability, and dependability of software often decide over success or failure of a product or service. In order to maintain a ***competitive industry***, we need future-proof software-systems.

Future-proof software-systems are specified, architected, designed, produced and evolved by ***software engineers***. For future-proof software-systems evolution, specialized skills – both hard skills and soft skills – are required. Those will also be taught in this lecture, thus making the participants valuable members of their future software teams in industry.



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Lecture Dates

The lecture times are 09:20 – 10:50 and 11:10 – 12:40 in room **APB/E006**, on the following dates: Please register your planned attendance in **jExam**.

Date	Topic
Wed., 16. October 2019	Introduction
Wed., 30. October 2019	Managed Evolution for Software
Wed., 13. November 2019	Architecting for Changeability (1)
Wed, 27. November 2019	Architecting for Changeability (2)
Wed., 11. December 2019	Architecting for Changeability (3)
Wed., 8. January 2020	Architecting for Dependability
Wed., 22. January 2020	Skills and Personality of the Future-Proof Software-Engineer

Exams and ECTS

Attendance and a successful oral exam result in **3 ECTS** credits.

The following dates are available for the oral exam: Thursday, 6. and Friday, 7. February 2020.

Links

Link: FPSS Lecture Flyer
Link: FPSS Learning Technique
Link: FPSS slides (become available shortly before the lecture)

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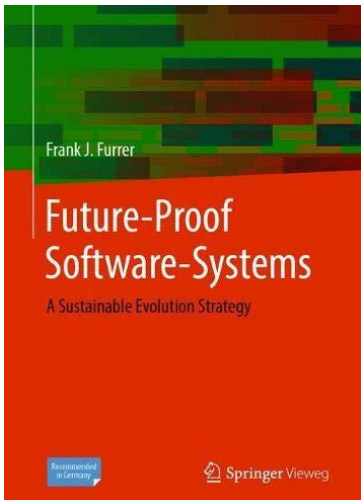

The lecture is based on the book:

Frank J. Furrer:

Future-Proof Software-Systems - *A Sustainable Evolution Strategy*

Springer Vieweg Verlag, Wiesbaden, Germany, October 2019

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Contact

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