Towards a Linear Algebra of Programming

(Schedule)

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Schedule

Session I — Monday, 18-Jun:

15m Presentation. Schedule. Evaluation.

1h Introduction — Software engineering and software quality: process and product. Focusing on product. Qualitative and quantitative methods. Abstract modeling.

15m Break

1h Introduction to "relational thinking": from predicate logic to relation algebra. Relational models. Logic versus relation algebra. Algebra of Programmin (AoP). Model checking. Tools: the Alloy Analyser. Strategy: Alloy meets the AoP.

30m Questions about the papers.

Schedule

Session II — Tuesday, 19-Jun:

1h15m	Relational thinking at work: Case study — modeling and certifying a Flash file system in the "Alloy meets the AoP" approach.
15m	Break
1h	Advanced "relational thinking": recursive models in the AoP. Divide-and-conquer programming schemes. Laws of programming.
30m	Questions about the papers.

Schedule

Session III — Wednesday, 20-Jun:

1h15m	Going quantitative. Motivation - "how much" preferred to "how"; going probabilistic. AoP goes linear: matrices replace relations. Distributions as a monad. Tools: the PFP library in Haskell. Simple examples.
15m	Break
1h00m	Case study: software quality evaluation by 'fault injection'. Fault injection by calculation: predicting how faults propagate in programs. Examples in Haskell: from faulty base cases to faulty inductive cases.
30m	Questions about the papers.

Schedule

Session IV — Thursday, 21-Jun:

1h	Wrapping up: summary and prospects for future research in the LAoP (linear algebra of programming).
20m	Break
1h40m	Evaluation - Paper recitation: 5 papers (20 min each)

Session V — Friday, 22-Jun:

1h40m	Evaluation - Paper recitation: 5 papers (20 min each)
20m	Break
1h20m	Evaluation - Paper recitation: 4 papers (20 min each).