From Data Types to Session Types: A Basis for Concurrency and Distribution (ABCD)

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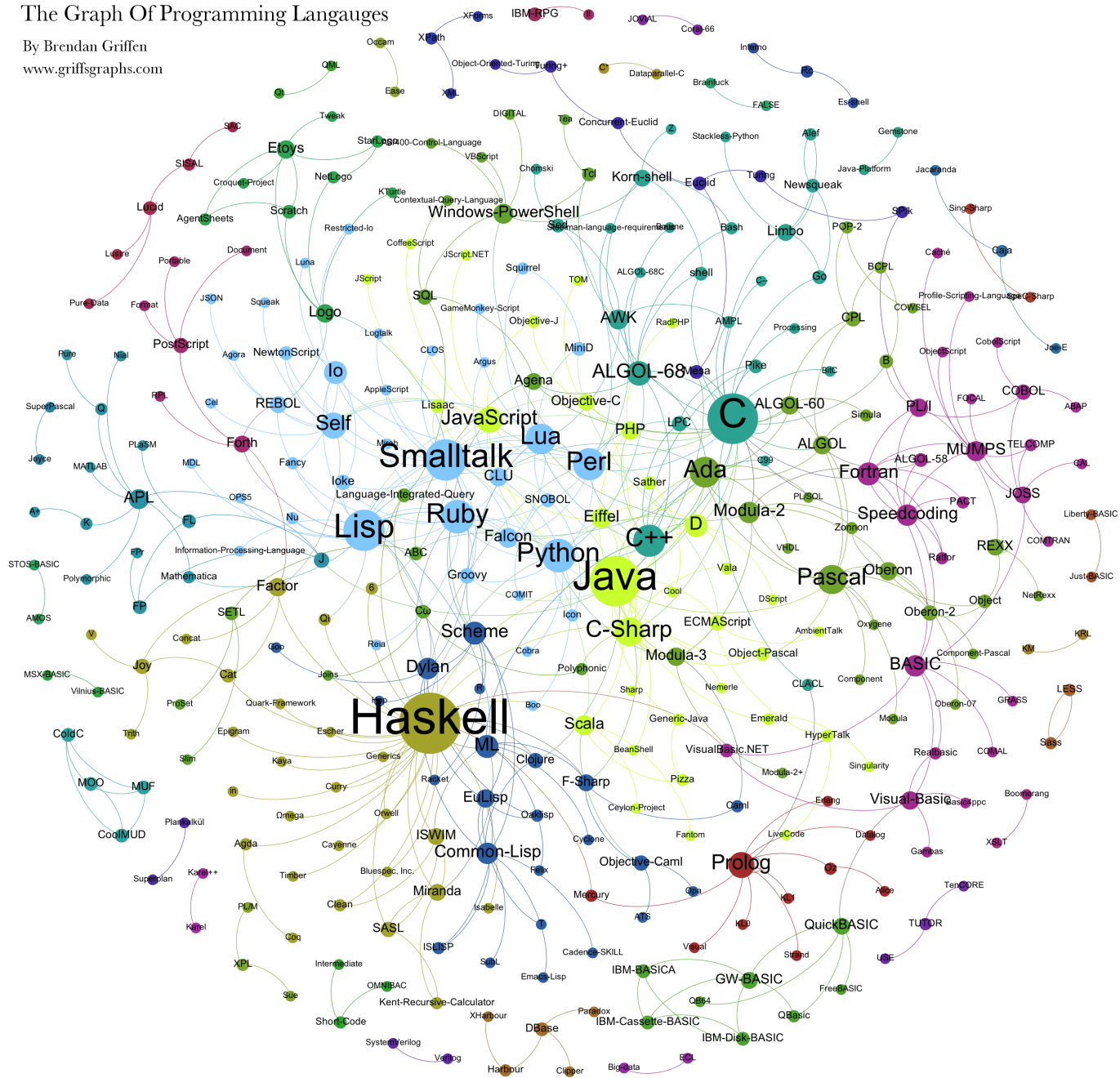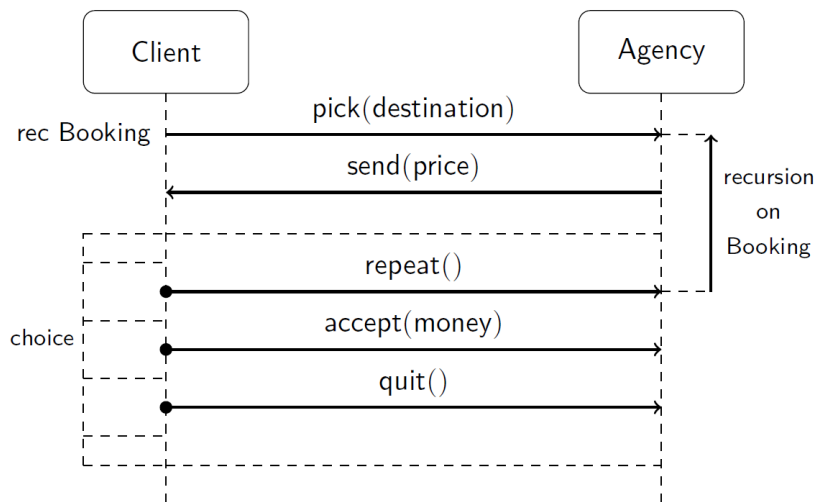
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Imperial College, 9 January 2014

The Graph Of Programming Langauges

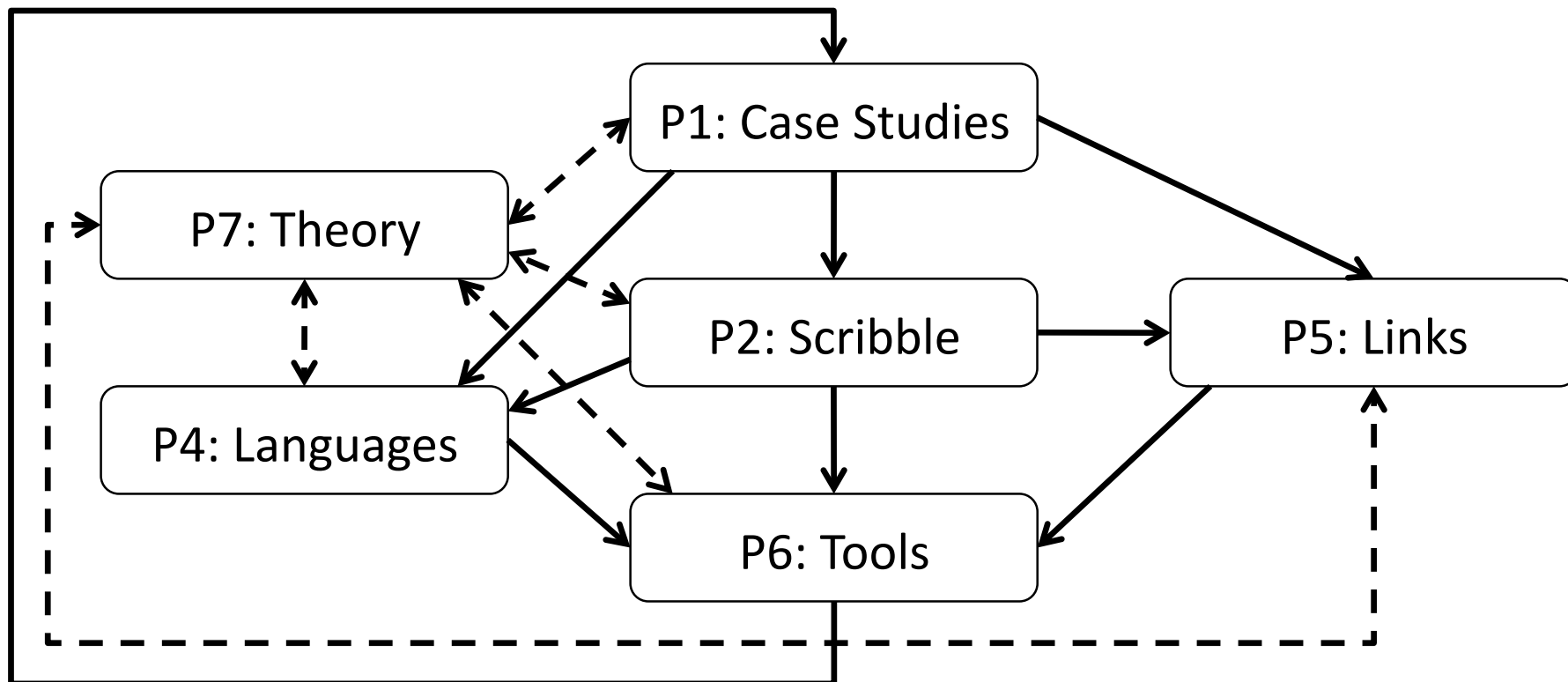By Brendan Griffen

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```
protocol TravelAgency(role Client, role Agency){
    rec Booking{
        pick(destination) from Client to Agency;
        send(price) from Agency to Client;
        choice at Client{
            accept(money) :
        }
        or{
            repeat() : Booking
        }
        or{
            quit() :
        }
    }
}
```

- **P1: Industrial Case Studies**
  start from case studies

- **P2: Inter-language operability (Scribble)**
  foundation for interoperability

- **P4: Mainstream Programming Languages**
  add session types to C, Java, Python, Ceylon

- **P5: Web Applications (Links)**
  session types unhindered by legacy

- **P6: Environments, Modelling, & Empirical Studies (Tools)**
  IDE, UML, & empirical studies

- **P7: Foundations of Session Types (Theory)**
  informed by and informs other projects

Gantt Chart — Work Packages

Work Package	Sites	Partners	Y1 1-6	Y1 7-12	Y2 1-6	Y2 7-12	Y3 1-6	Y3 7-12	Y4 1-6	Y4 7-12	Y5 1-6	Y5 7-12
P1: Industrial Case Studies												
WP1-1 Amazon Web Services	ED, GL	Amz	█	█	█							
WP1-2 Distributed Enterprise Applications	IC, GL	Cog, RH	█	█	█							
WP1-3 OOI Cyberinfrastructure	IC, ED	OOI	█	█	█							
WP1-4 Messaging	IC	VM	█	█	█							
WP1-5 Review & Organisation	ALL	ALL		█	█	█						
P2: Inter-language Interoperability												
WP2-1 Scribble and Scribble Tools	IC, GL	Cog, RH	█	█	█	█	█	█				
WP2-2 Programming Interface, APIs, Runtimes	IC, GL	VM, OOI, RH		█	█	█	█	█	█			
WP2-3 Communication Libraries	IC, GL	VM, OOI			█	█	█	█	█	█		
WP2-4 Outreach to Developers	IC, GL	Cog, RH, OOI, VM								█	█	
P4: Mainstream Programming Languages												
WP4-1 Session Types & Typestate in Java	GL, IC	Amz	█	█	█	█	█					
WP4-2 Gradual Session Types in Python	IC, ED	OOI	█	█	█	█	█					
WP4-3 Session C and MPI	IC				█	█	█	█				
WP4-4 Session Types for Ceylon	GL, IC	RH							█	█	█	█
WP4-5 Global Types and Scribble	GL, IC	VM		█	█	█	█	█	█	█	█	█
WP4-6 Website for Session-Typed Languages	GL			█	█	█	█	█	█	█	█	█
P5: Web Applications												
WP5-1 Session Types in Links	ED, GL	Cog	█	█	█	█	█					
WP5-2 Session Types for Distribution	ED, GL						█	█	█	█		
WP5-3 Reliability and Recovery	ED, GL							█	█	█		
WP5-5 Case Studies and Empirical Evaluation	ED, GL	Amz			█						█	
WP5-6 Infrastructure	ED, GL				█	█	█				█	█
WP5-7 Tutorial and Dissemination	ED, GL						█	█			█	█
P6: Environments, Modelling & Empirical Studies												
WP6-1 Environments	IC, ED	Cog, RH					█	█	█	█		
WP6-2 Modelling	IC, ED	Cog, RH						█	█	█		
WP6-3 Empirical Studies	ALL	Amz, Cog			█	█					█	█
P7: Foundations of Session Types												
WP7-1 Races and Deadlock	ED, GL		█	█	█	█	█					
WP7-2 Multiparty Session Types	ED, GL, IC				█	█	█	█	█	█		
WP7-3 Productive Streams	ED, GL								█	█	█	█
WP7-4 Extensions for BPMN 2.0	IC		█	█	█	█	█					
WP7-5 Synthesis	IC				█	█	█	█	█	█		
WP7-6 Other Formalisms	IC		█	█	█	█	█	█	█	█	█	█
All-hands technical meetings	ALL	ALL	🔴	🔴	🔴	🔴	🔴	🔴	🔴	🔴	🔴	🔴
Advisory board meetings	ALL	ALL	🔵	🔵	🔵	🔵	🔵	🔵		🔵		🔵
Open workshops	ALL	ALL						Industry 🟢		Academia 🟢		Developers 🟢

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