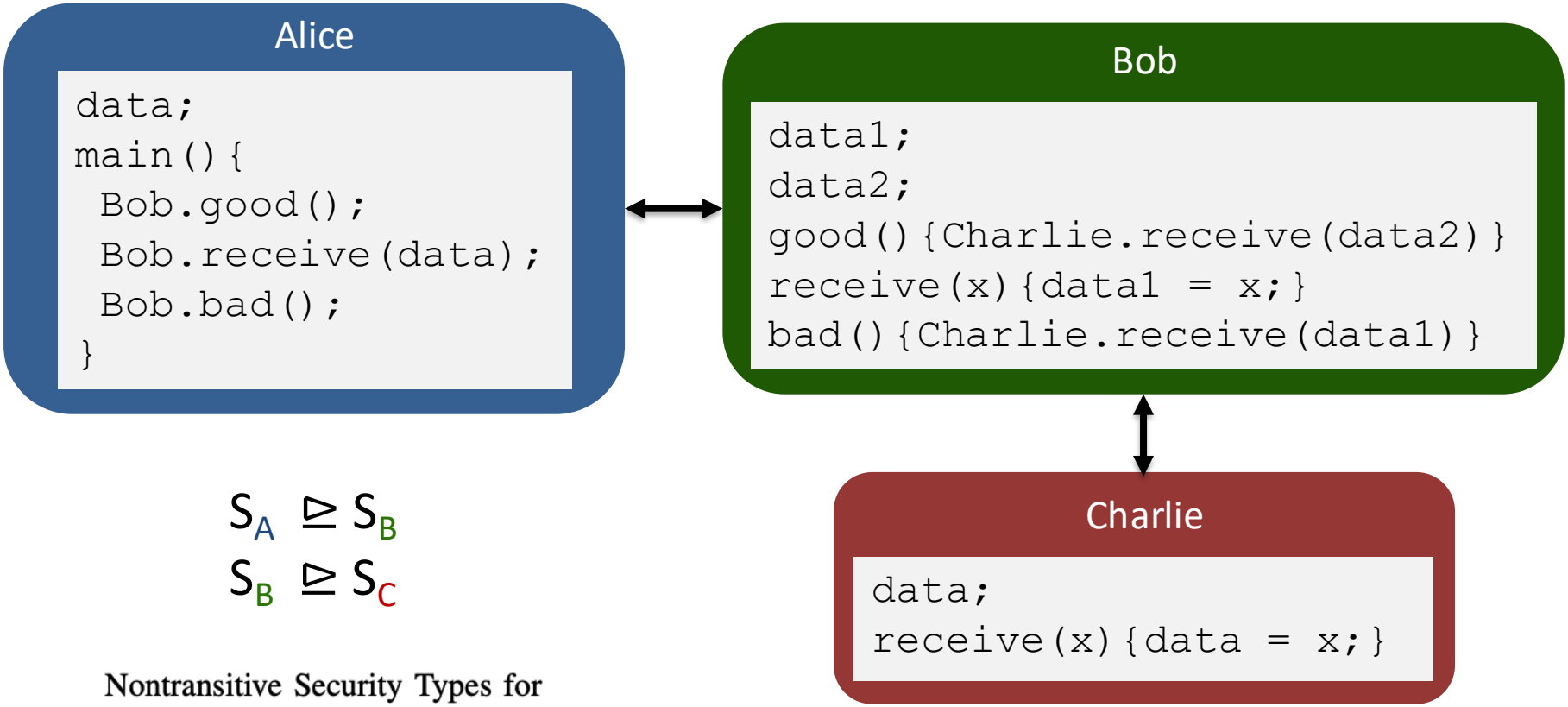
Non-transitive Policies Transpiled

Mohammad Ahmadpanah Aslan Askarov Andrei Sabelfeld

5-min talk @ CSF'20
June 25, 2020

Non-transitive Noninterference (NTNI)



$S_A \trianglerighteq S_B$

$S_B \trianglerighteq S_C$

Nontransitive Security Types for Coarse-grained Information Flow Control

Yi Lu
School of Computer Science
Queensland University of Technology
Brisbane, Australia
yt.lu@qut.edu.au

Chenyi Zhang
College of Information Science and Technology
Jinan University
Guangzhou, China
chenyi_zhang@jnu.edu.cn

CSF'20

side note: Non-transitive ≠ Intransitive
(confinement) (declassification)

Non-transitive Flows

$S_A \trianglerighteq S_B$

$S_B \trianglerighteq S_C$

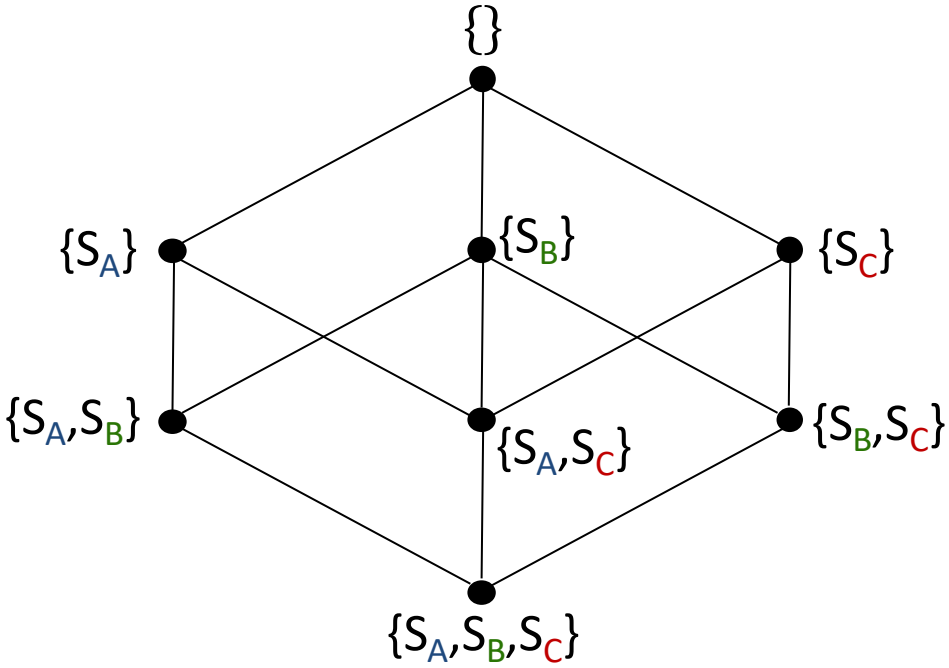
Alice.data	S_A
Bob.data1	S_B
Bob.data2	S_B
Charlie.data	S_C

```
[S_C] Charlie.data = Bob.data2   [S_B]
[S_B] Bob.data1   = Alice.data   [S_A]
[S_C] Charlie.data = Bob.data1   [S_A, S_B]
```

NTNI ⇔ NI

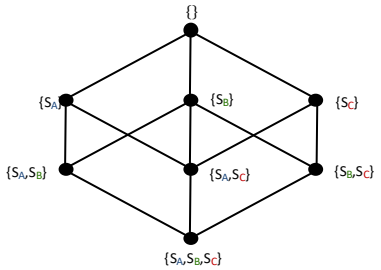
$S_A \trianglerighteq S_B$

$S_B \trianglerighteq S_C$



NTT ⇒ Flow-sensitive

$S_A \trianglerighteq S_B$
$S_B \trianglerighteq S_C$



			:{*can flow to*}
init	Alice.data	= Alice.data_src	:{S_A,S_B}
	Bob.data1	= Bob.data1_src	:{S_B,S_C}
	Bob.data2	= Bob.data2_src	:{S_B,S_C}
	Charlie.data	= Charlie.data_src	:{S_C}
	Charlie.data	= Bob.data2	:{S_B,S_C}
	Bob.data1	= Alice.data	:{S_A,S_B}
	Charlie.data	= Bob.data1	:{S_A,S_B}
finalize	Alice.data_snk	= Alice.data	$\{S_A\} \subseteq \{S_A,S_B\}$
	Bob.data1_snk	= Bob.data1	$\{S_B\} \subseteq \{S_A,S_B\}$
	Bob.data2_snk	= Bob.data2	$\{S_B\} \subseteq \{S_B,S_C\}$
	Charlie.data_snk	= Charlie.data	$\{S_C\} \not\subseteq \{S_A,S_B\}$

Conjectures

- NTNI(P, $\trianglerighteq$) = NI($\wp(\mathcal{L})$)
- Soundness of flow-sensitive analysis on transformed program
- Permissiveness
  - NTT(prog) ⇒ Flow-sensitive (Transform(prog))