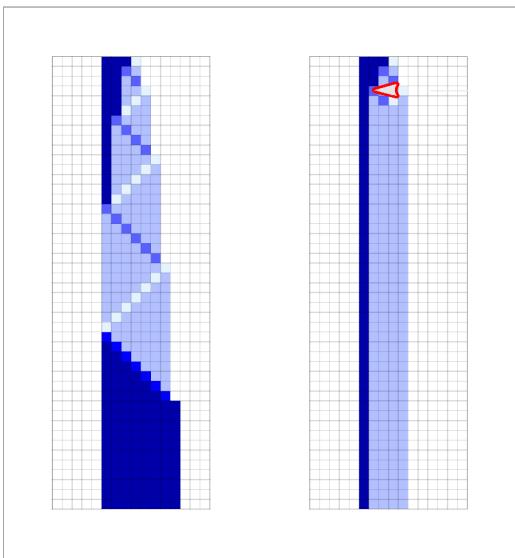


Towards a Minimal Model for Computer Security

Willem Nielsen

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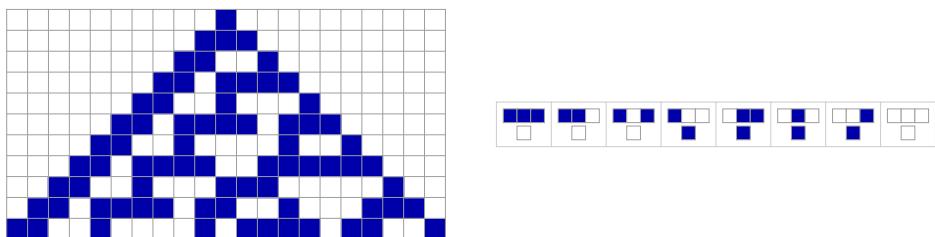


Motivation: Working with Stephen Wolfram



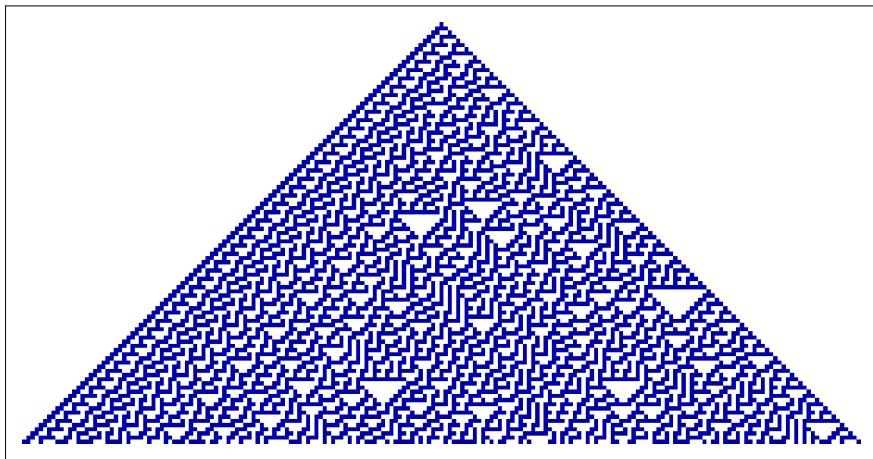
Cellular Automata: A Simple Computational System

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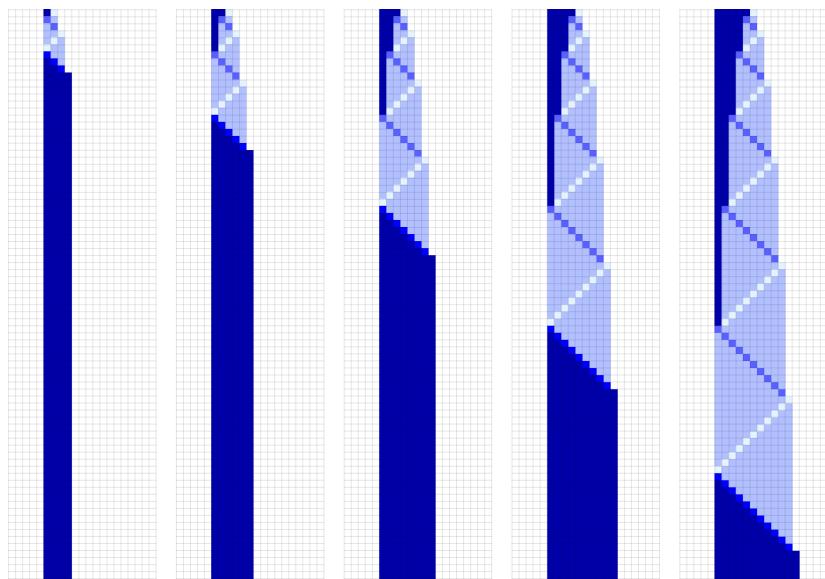
Rule 30: Simple Programs can Generate Complex Behavior

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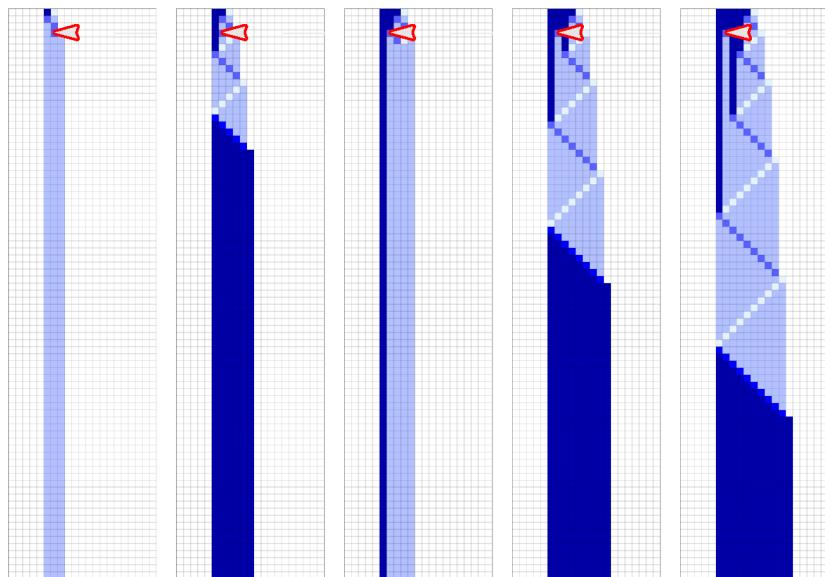
Modeling a Software System: Doubling Procedure

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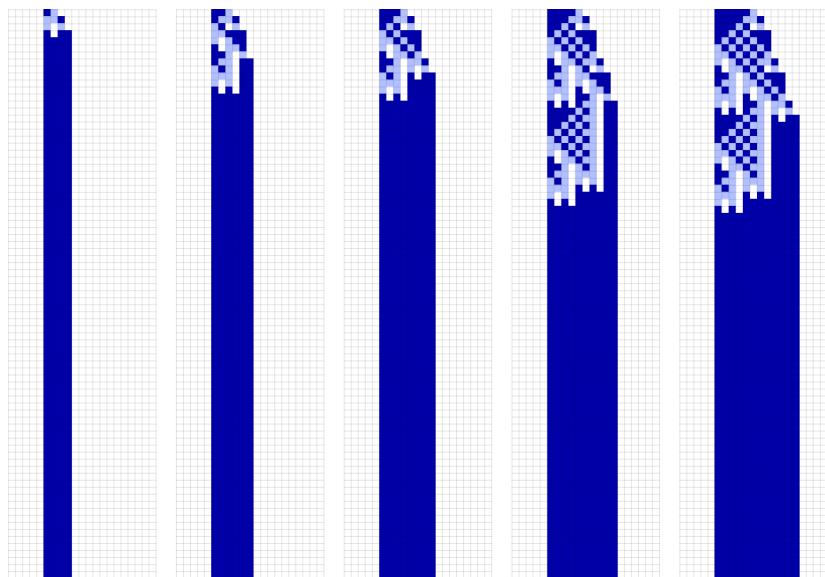
Modeling an Attacker: Perturbing the System

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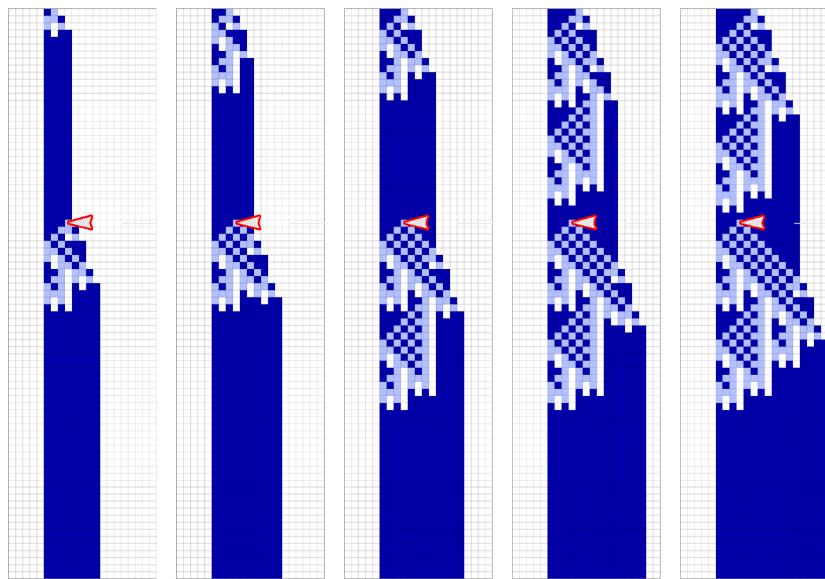
Exploring the Model: A More Efficient Procedure

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Exploring the Model: A More Efficient Procedure

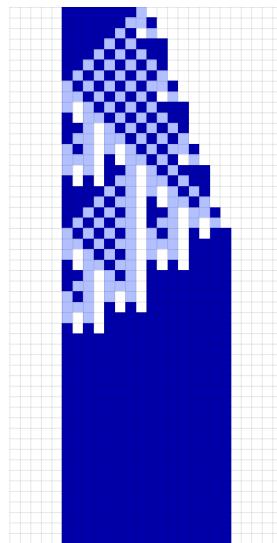
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A Larger Attack Surface: Perturbing the Rules

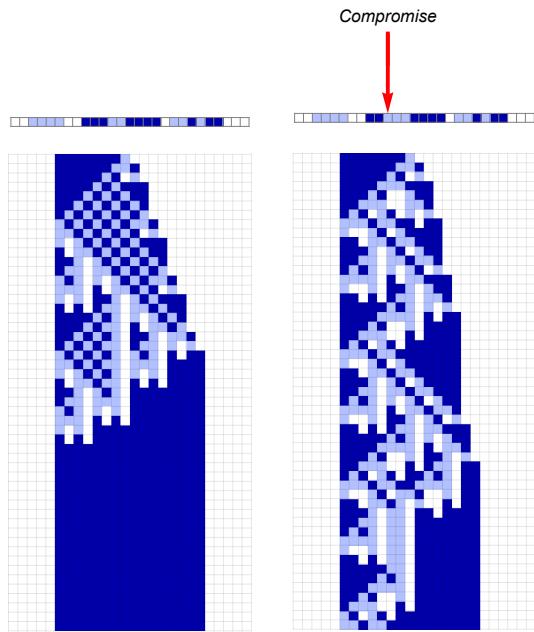
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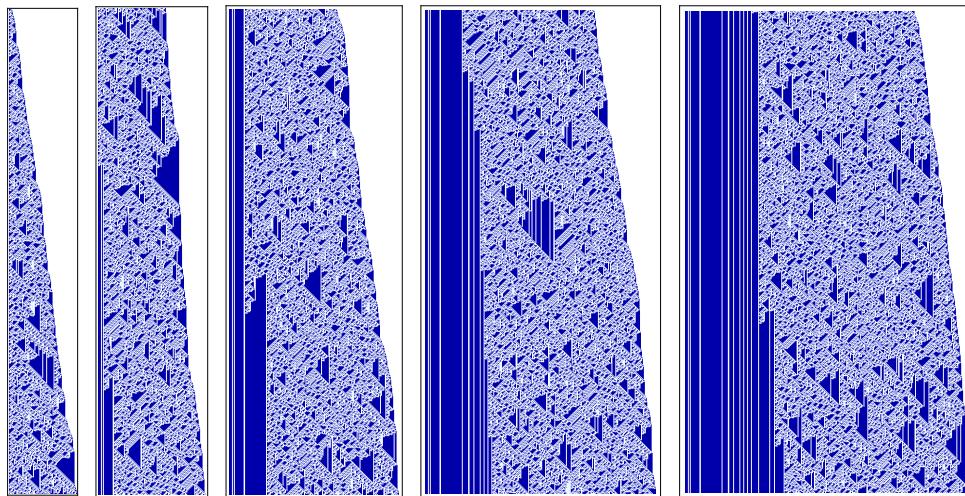
A Larger Attack Surface: Perturbing the Rules

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A Larger Attack Surface: Perturbing the Rules

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Bottom Line: *Computational irreducibility is what makes computer security challenging*

Future Work: More Sophisticated Software Systems

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