Lecture 27 – Course Review

COSE215: Theory of Computation

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2023 Spring

Goal of This Course

PLRG

- What is the *mathematical model* of computers?

Goal of This Course

PLRG

- What is the *mathematical model* of computers?

Turing Machine!

Let's learn **Turing Machine**

Goal of This Course

PLRG

- What is the *mathematical model* of computers?

Turing Machine!

Let's learn **Turing Machine**

- Is it possible to solve *every problem* using computers?

Goal of This Course

PLRG

- What is the *mathematical model* of computers?

Turing Machine!

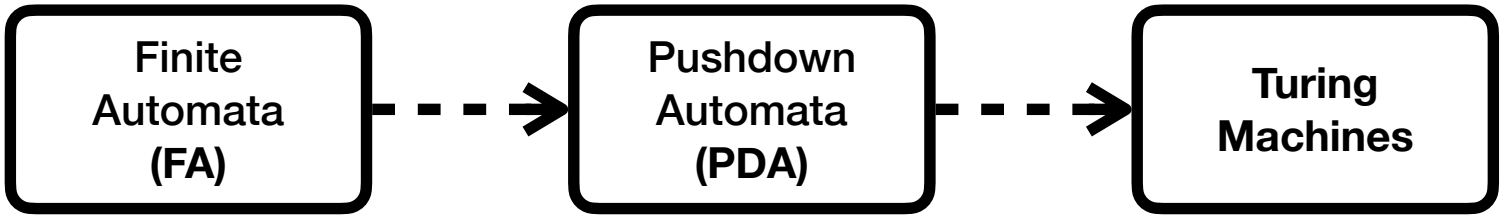
Let's learn **Turing Machine**

- Is it possible to solve *every problem* using computers?

No!

Let's learn **Undecidability** and **Intractability**

Roadmap: Towards Turing Machine



- **Finite Automata (FA)**
  - Regular Expressions and Languages
  - Applications: text search, etc.
- **Pushdown Automata (PDA)**
  - Context-Free Grammars (CFGs) and Languages (CFLs)
  - Applications: programming languages, natural language processing, etc.
- **Turing Machines (TMs)**
  - Extensions of Turing Machines
  - Undecidability and Intractability

Summary

	Automata	Grammars	Languages
(Part 3) Turing Machines			
(Part 2) Pushdown Automata			
(Part 1) Finite Automata			
(Part 0) Basic Concepts			

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PLRG

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(Part 3) Turing Machines			
(Part 2) Pushdown Automata			
(Part 1) Finite Automata	(Lecture 3) DFA		(Lecture 3) RL
(Part 0) Basic Concepts	(Lecture 1) **Mathematical Preliminaries**	(Lecture 2) **Scala**	

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(Part 1) Finite Automata	(Lecture 4) NFA $\rightleftarrows$ (Lecture 3) DFA		(Lecture 3) RL
(Part 0) Basic Concepts	(Lecture 1) **Mathematical Preliminaries**	(Lecture 2) **Scala**	

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(Part 1) Finite Automata	(Lecture 4) (Lecture 3) (Lecture 5) NFA $\rightleftarrows$ DFA $\rightleftarrows$ ϵ-NFA	(Lecture 6) RE	(Lecture 3) RL
(Part 0) Basic Concepts	(Lecture 1) **Mathematical Preliminaries**	(Lecture 2) **Scala**	

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(Part 3) Turing Machines			
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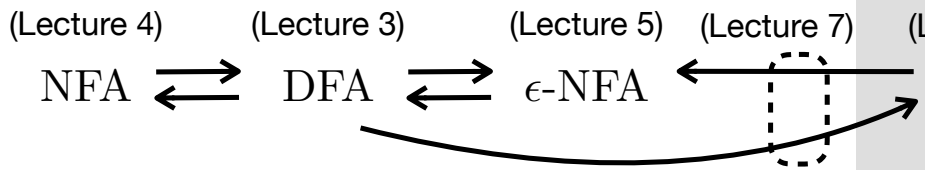
(Part 1) Finite Automata			(Lecture 3) RL
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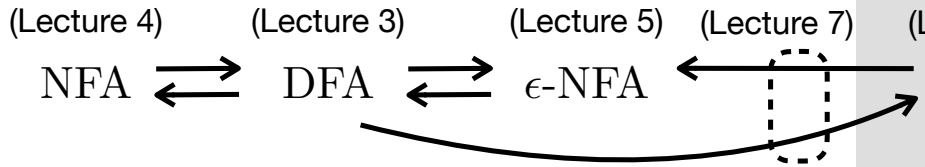
(Part 1) Finite Automata			(Lecture 3) RL **Closure Properties** (Lecture 8)
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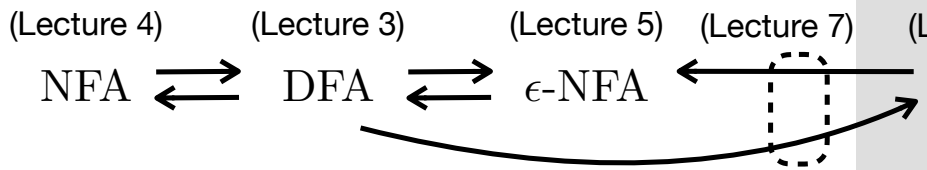
(Part 1) Finite Automata			(Lecture 3) RL **Closure Properties** (Lecture 8) **Pumping Lemma** (Lecture 9)
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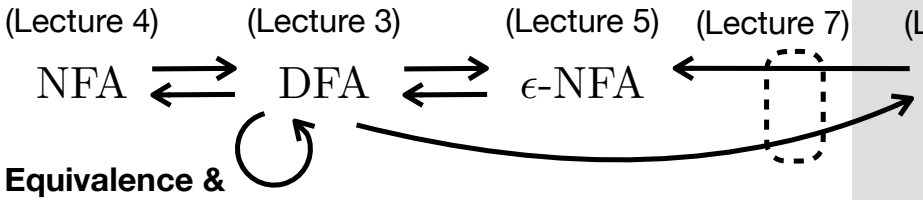
(Part 1) Finite Automata	 **Equivalence & Minimization** (Lecture 10)		(Lecture 3) RL **Closure Properties** (Lecture 8) **Pumping Lemma** (Lecture 9)
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(Part 2) Pushdown Automata		(Lecture 11/12) CFG	(Lecture 11) CFL
(Part 1) Finite Automata	(Lecture 4) NFA ⇄ (Lecture 3) DFA ⇄ (Lecture 5) ϵ-NFA ⇄ (Lecture 7) RE (Lecture 6) **Equivalence & Minimization** (Lecture 10)		(Lecture 3) RL **Closure Properties** (Lecture 8) **Pumping Lemma** (Lecture 9)
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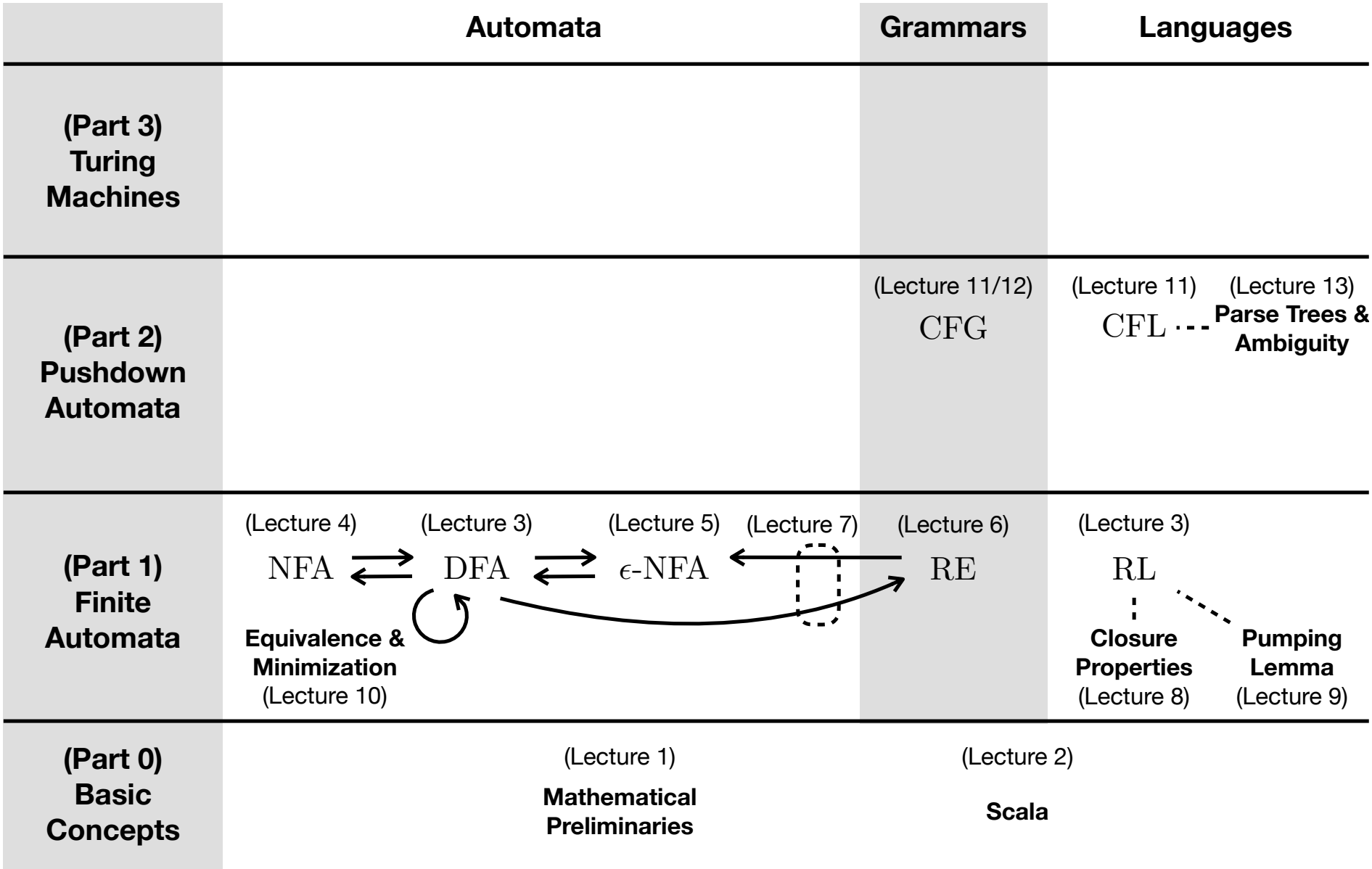
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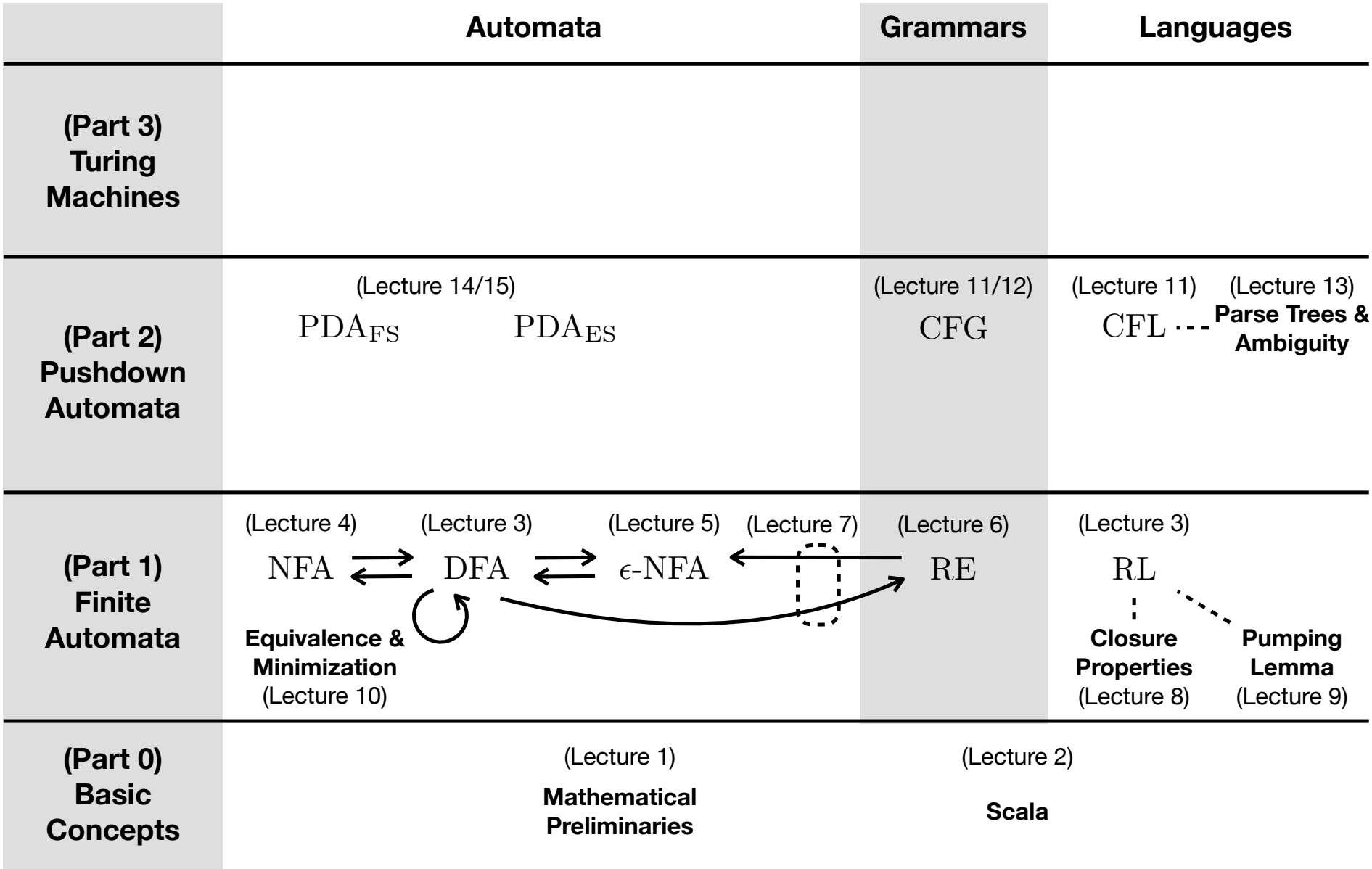
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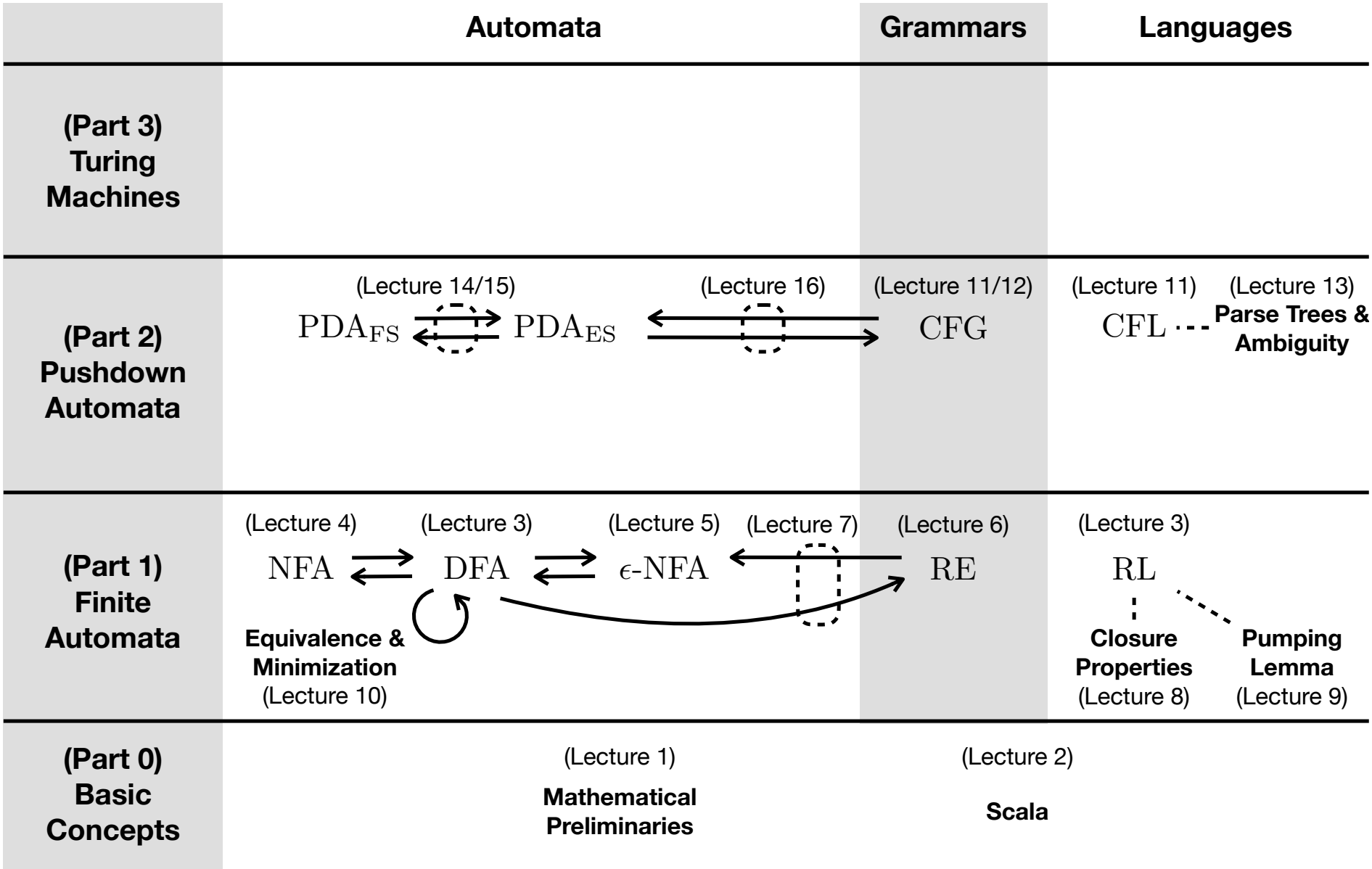
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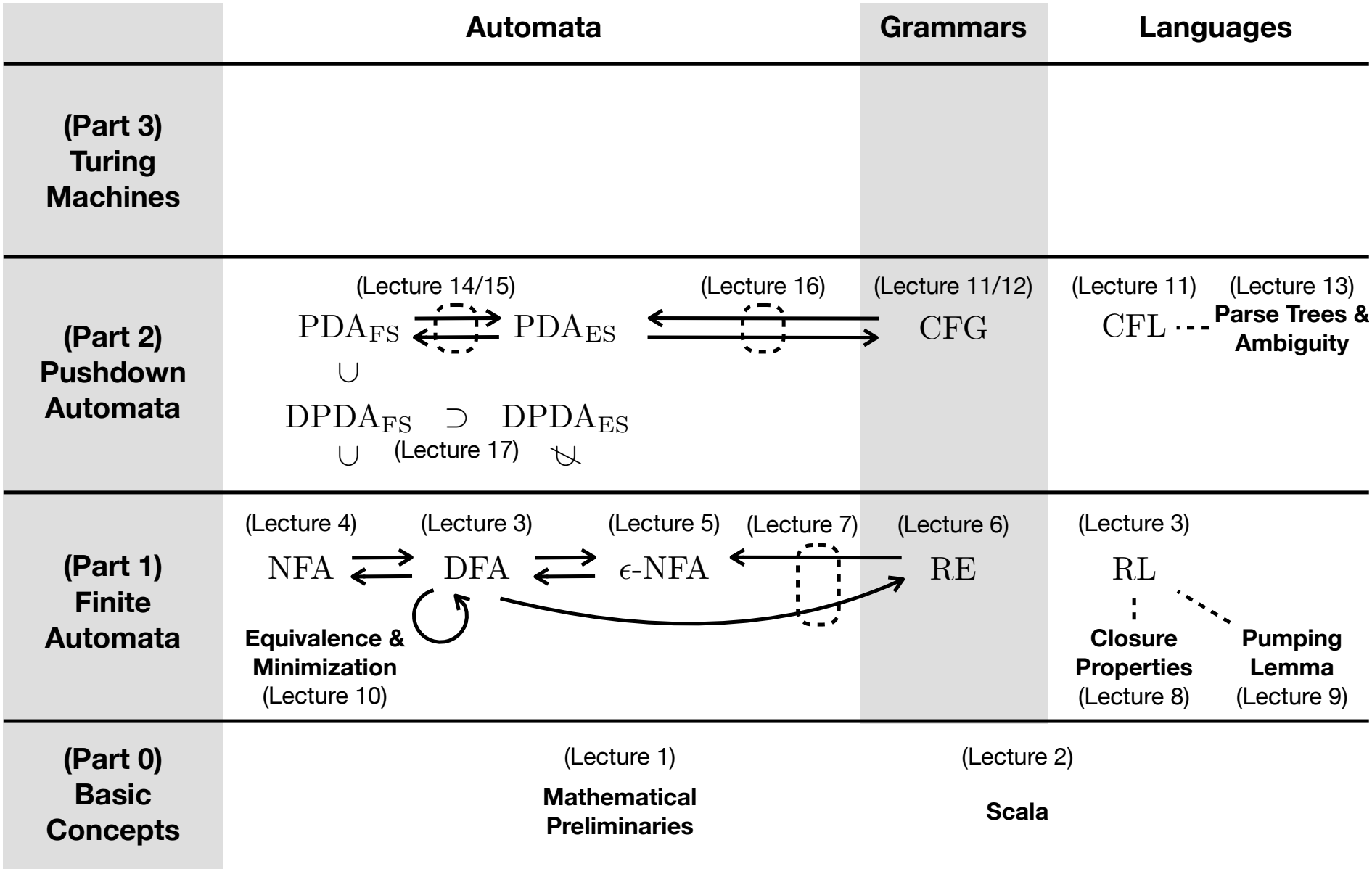
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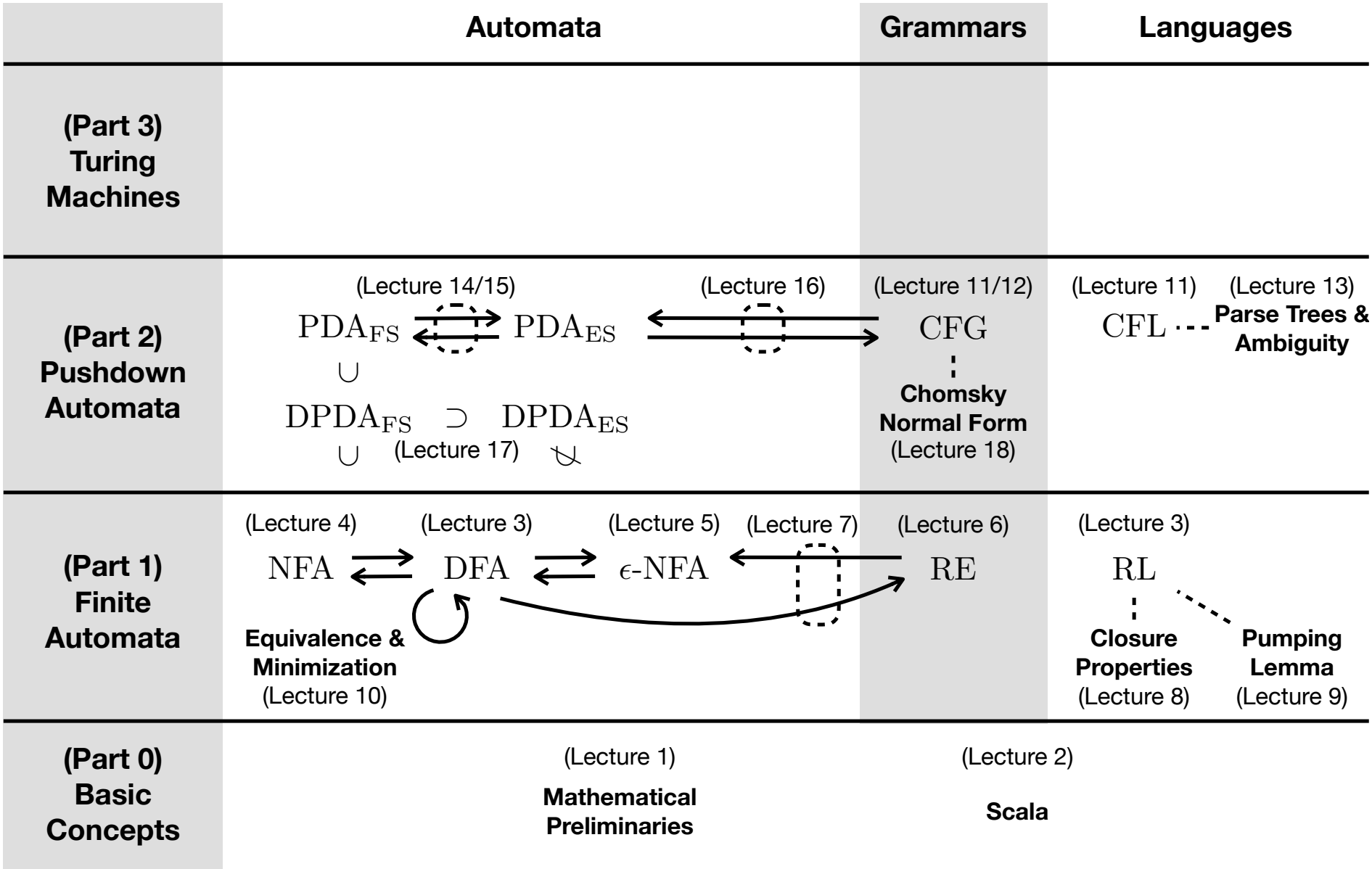
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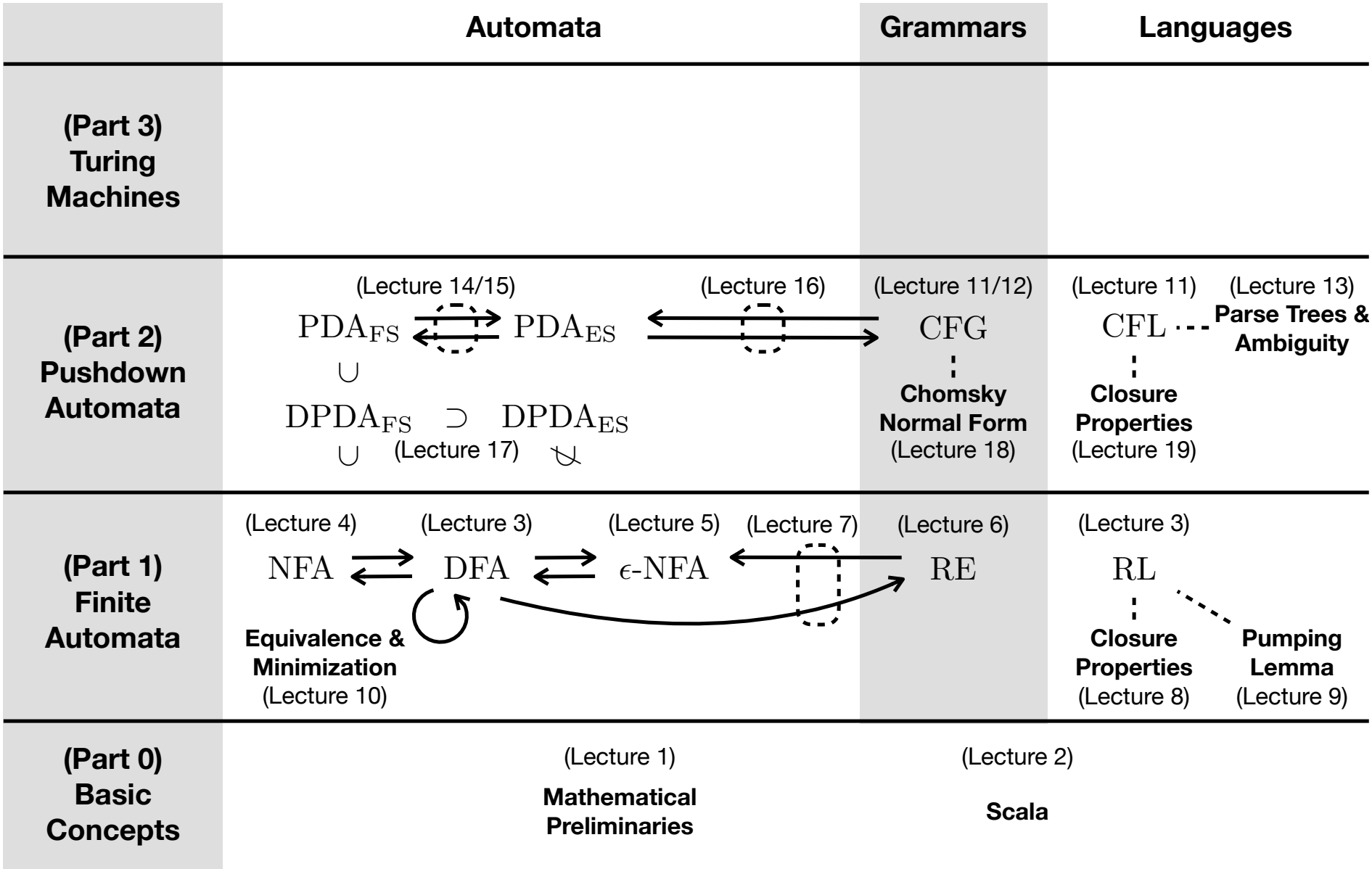
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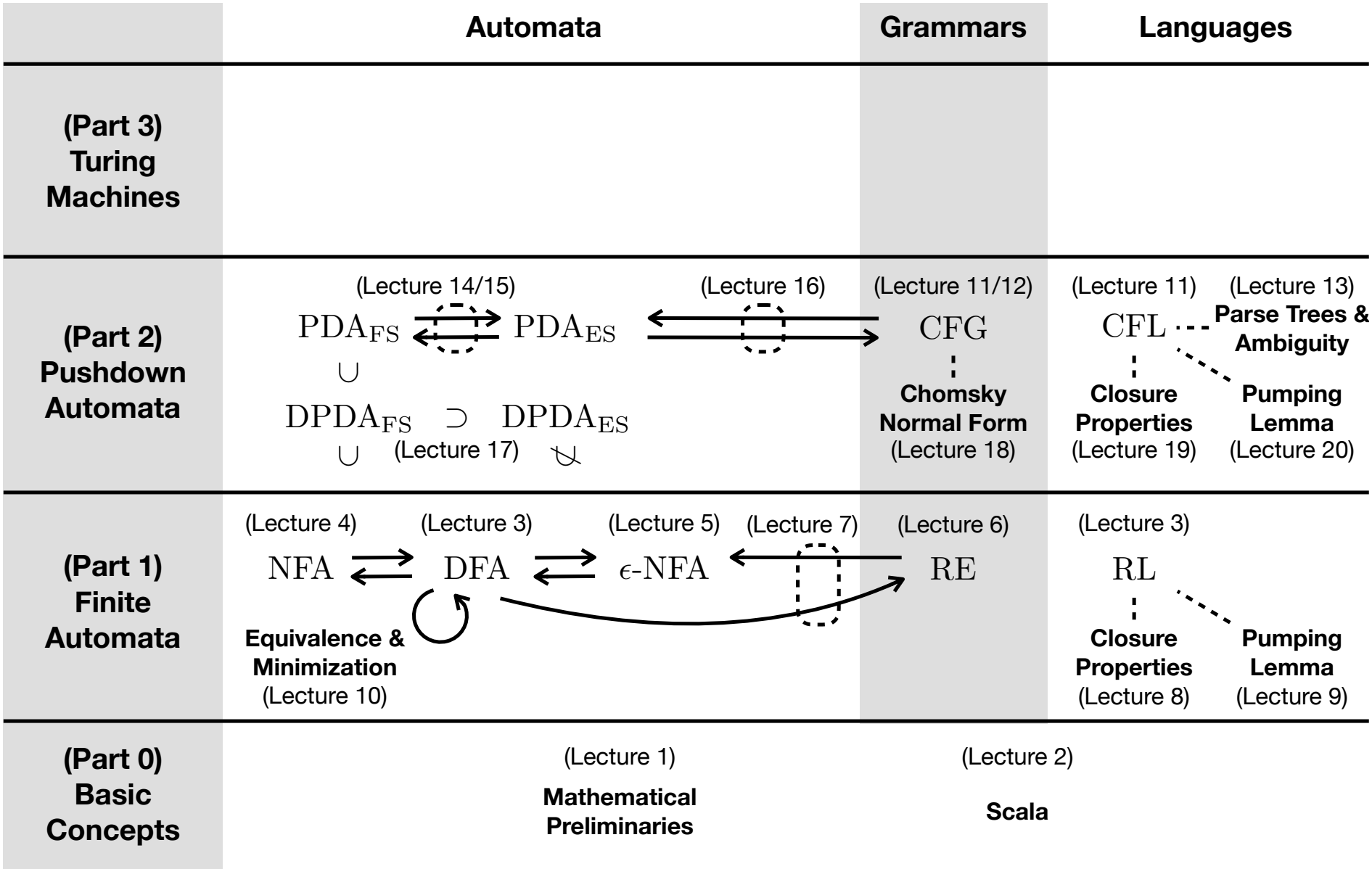

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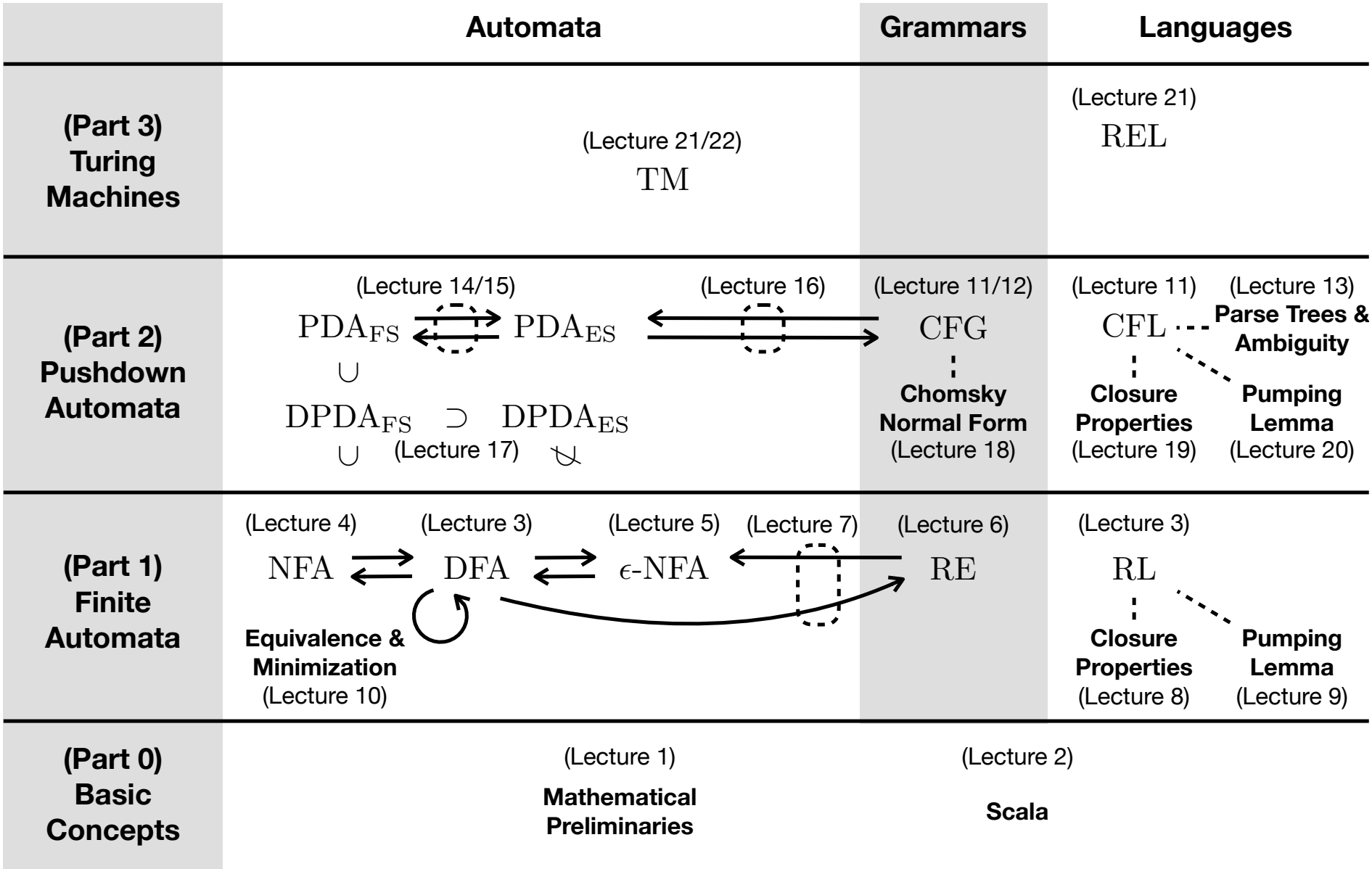

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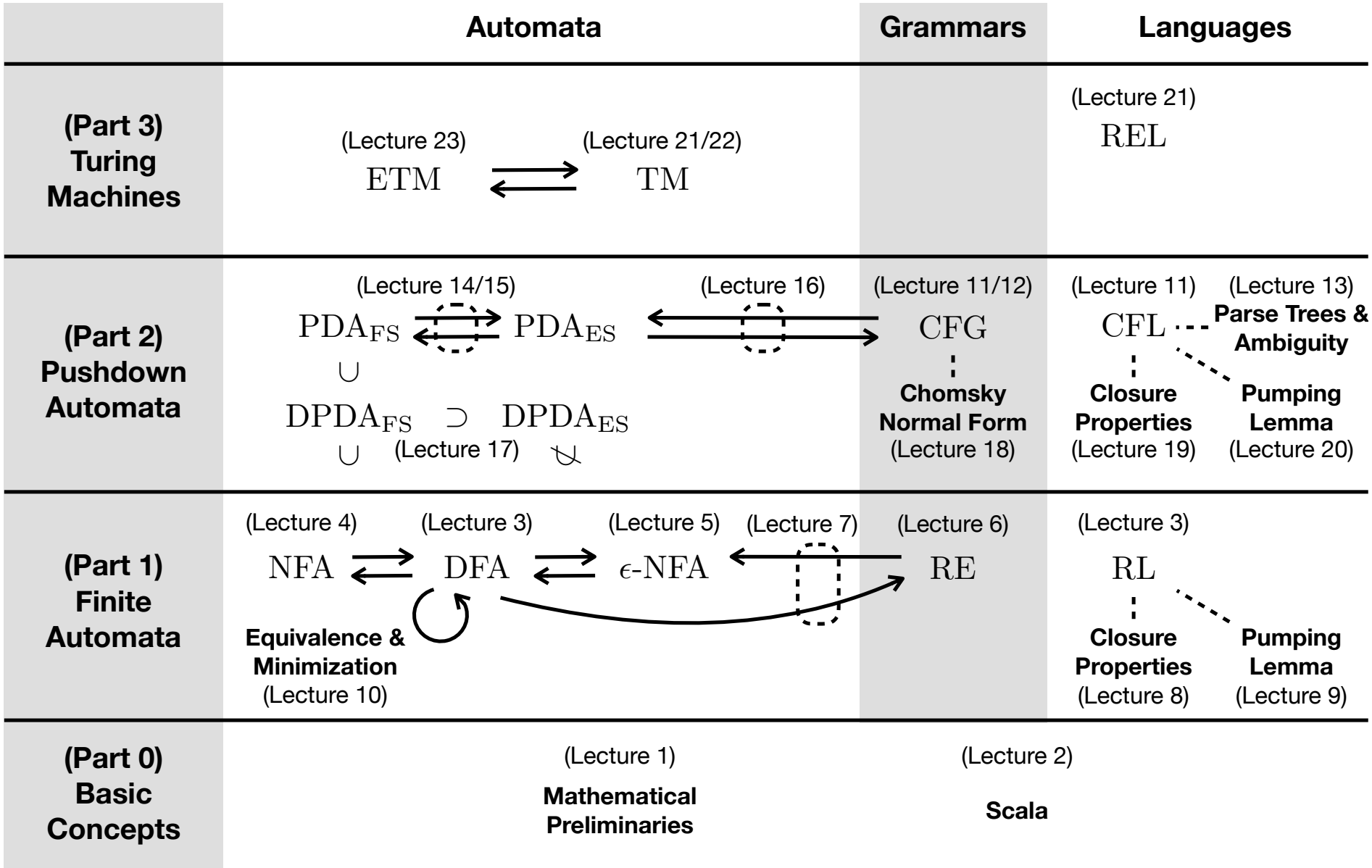
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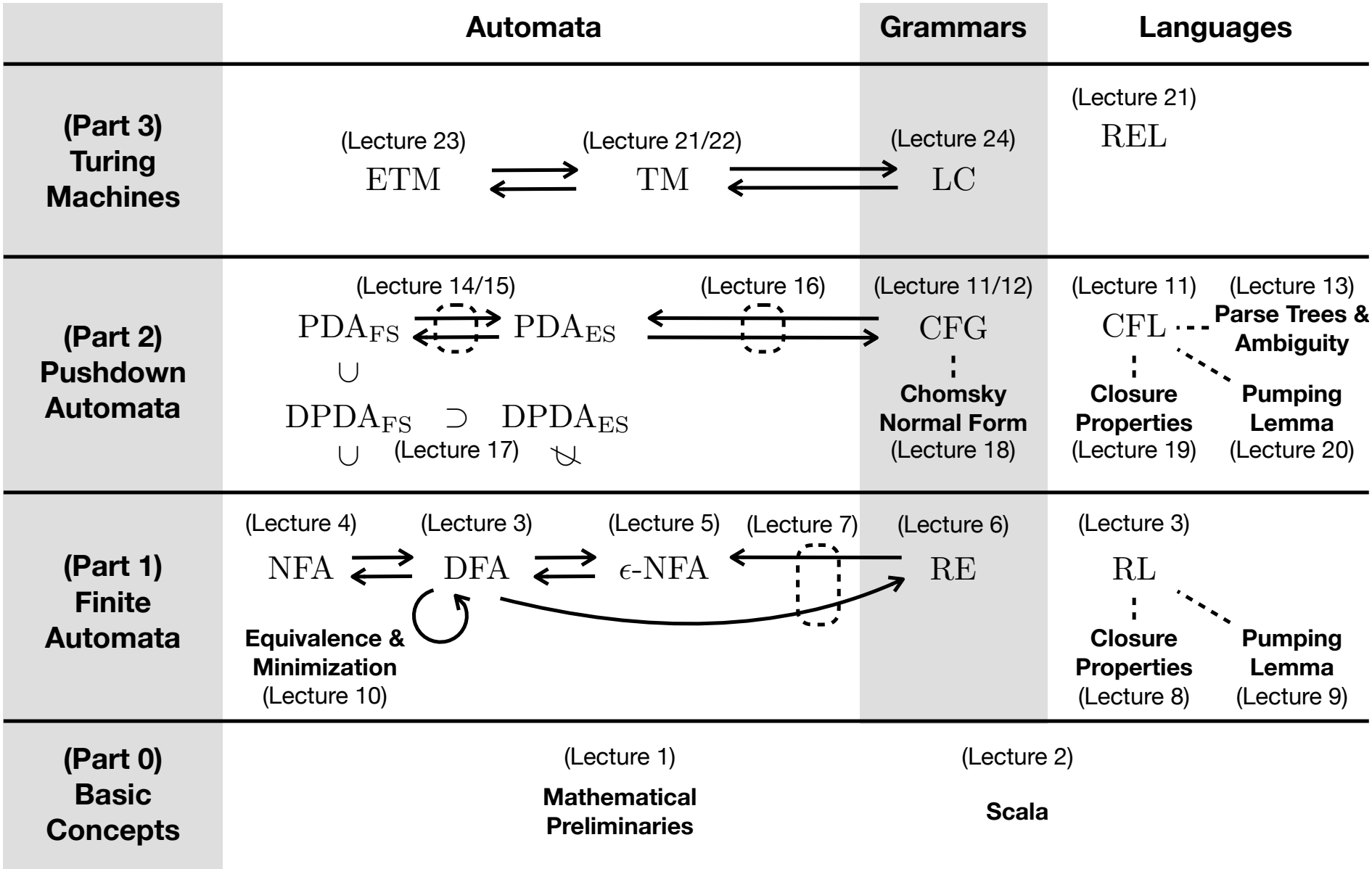
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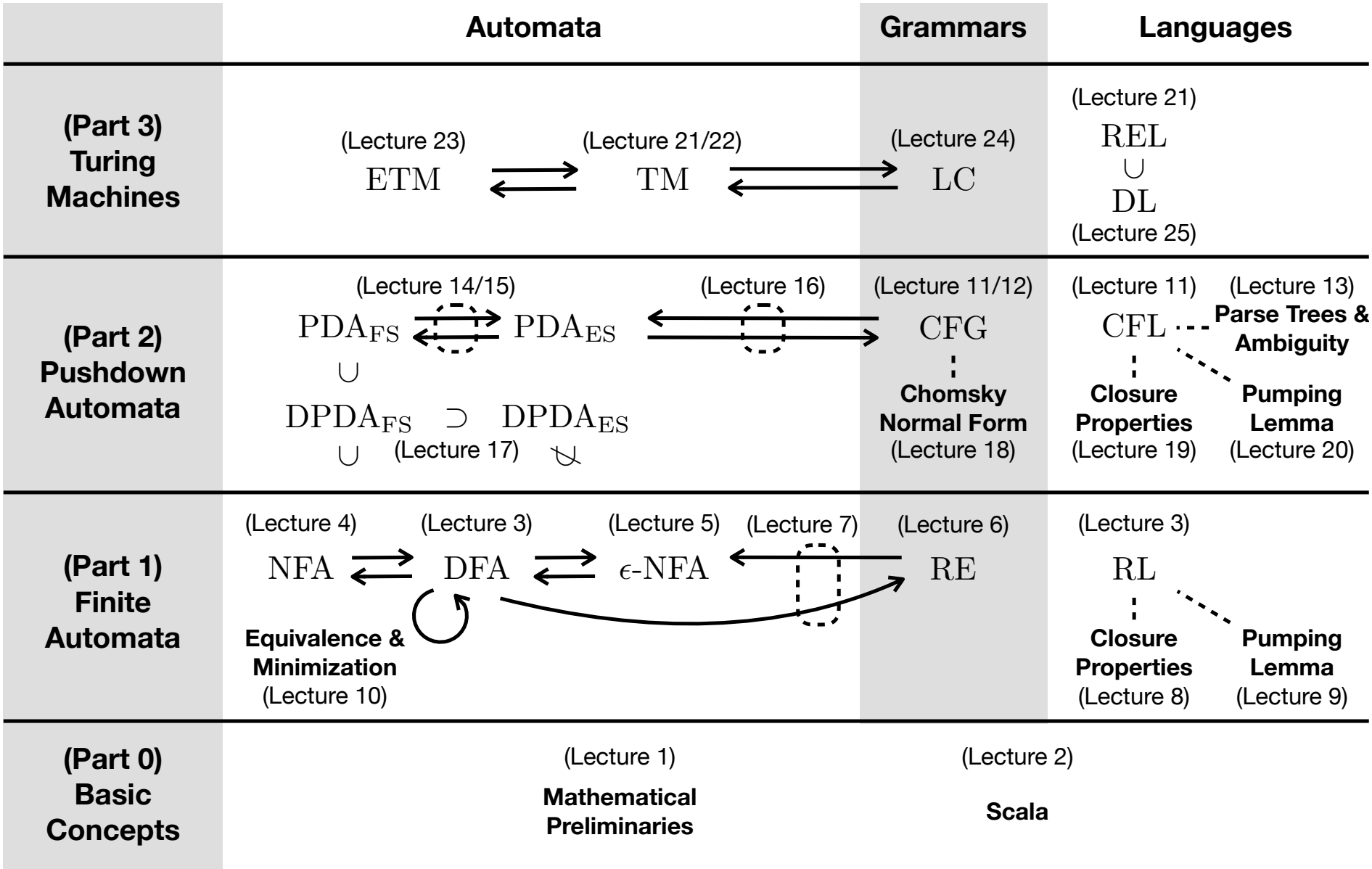
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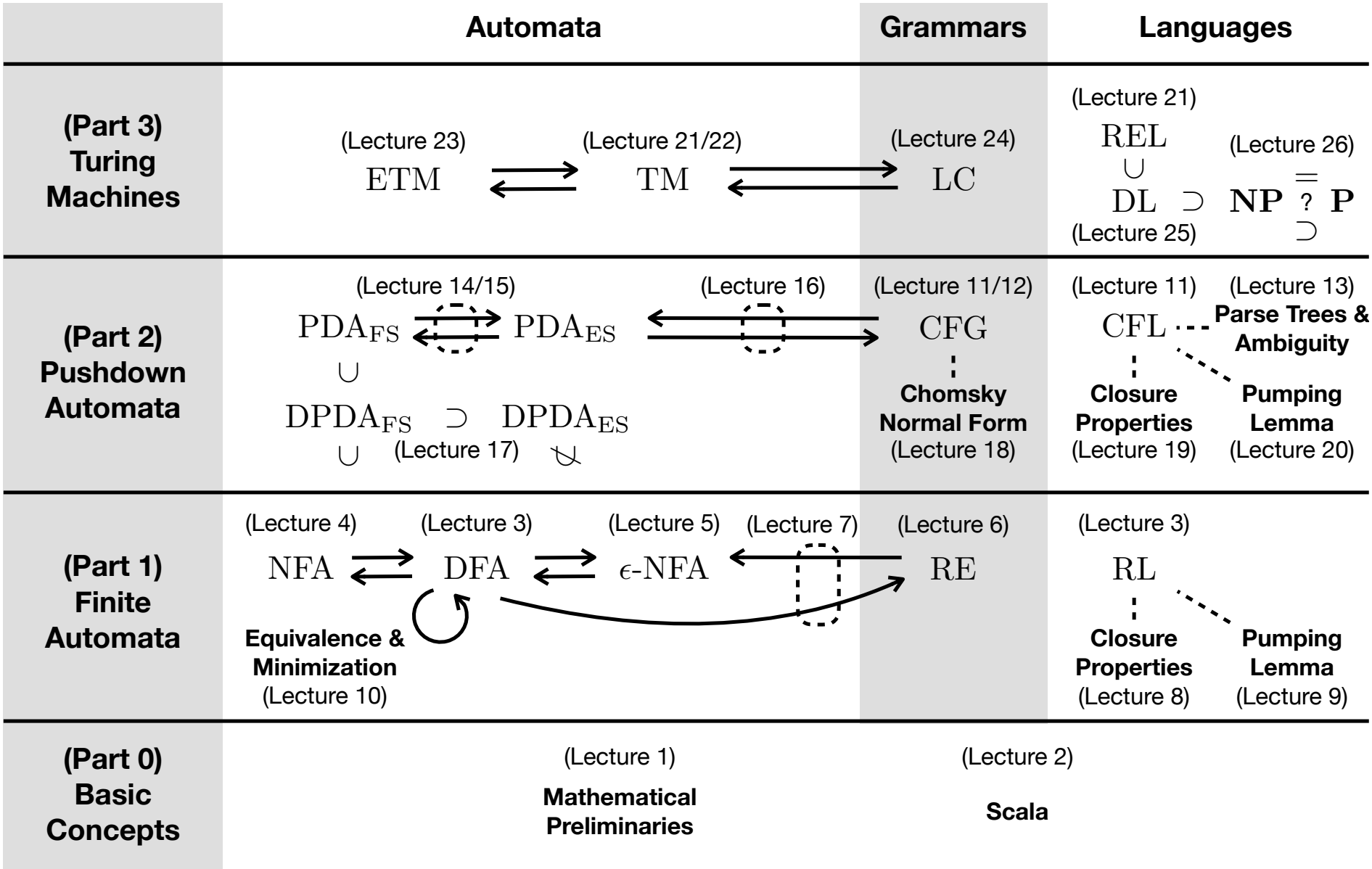

- I hope you enjoyed the class!

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