



Appunti realizzati da Merenda Saverio Mattia

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Sul mio sito web puoi trovare moltissimi appunti di altre materie, esercitazioni e repository GitHub contenenti tutti gli esercizi svolti per ogni corso.

Scansiona il QR-CODE o digita merendamattia.com/uni



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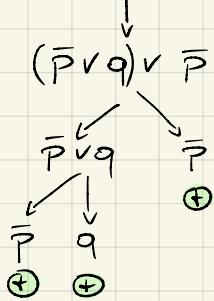
Potete supportare il mio lavoro offrendomi un caffè:



Ripetizioni: hai bisogno di aiuto per studiare qualche materia?
Puoi contattarmi alla seguente email: info@merendamattia.com

MÉTHODE DES TABLEAUX

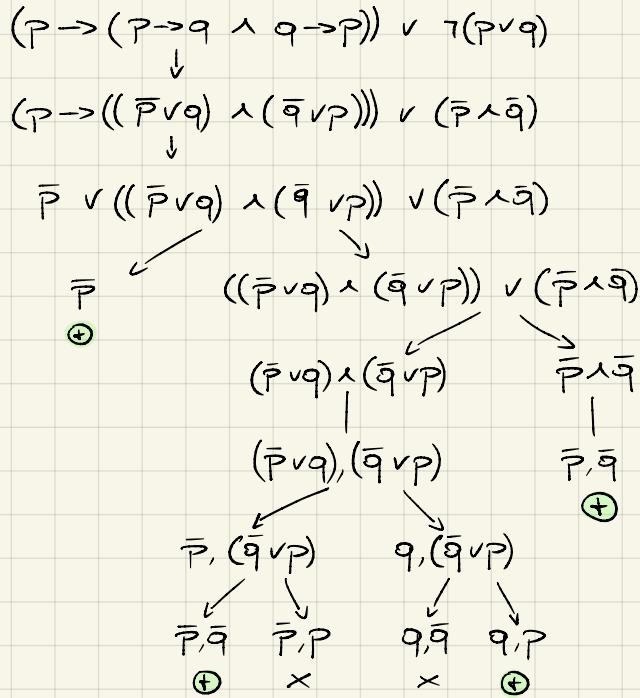
$$\textcircled{1} \quad (P \rightarrow Q) \vee \neg P$$



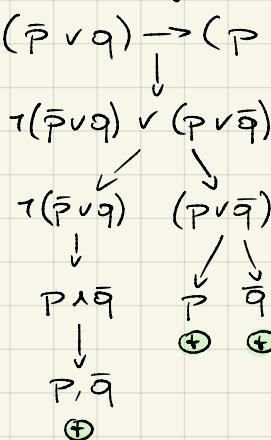
- Definability of logical connectives

- $A \equiv B \leftrightarrow (A \rightarrow B) \wedge (B \rightarrow A)$
- $A \rightarrow B \leftrightarrow \neg A \vee B \leftrightarrow \neg(A \wedge \neg B)$
- $A \wedge B \leftrightarrow \neg(\neg A \vee \neg B) \leftrightarrow \neg(A \rightarrow \neg B)$
- $A \vee B \leftrightarrow \neg(\neg A \wedge \neg B) \leftrightarrow \neg A \rightarrow B$

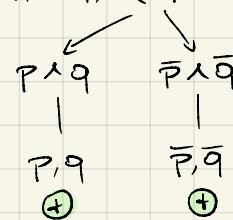
$$\textcircled{2} \quad (P \rightarrow (P \equiv q)) \vee \neg(P \vee q)$$



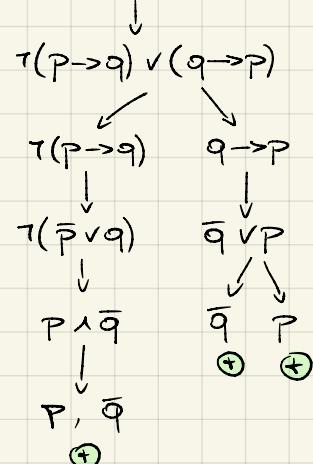
$$\textcircled{5} \quad (P \rightarrow q) \rightarrow (\bar{P} \rightarrow \bar{q})$$



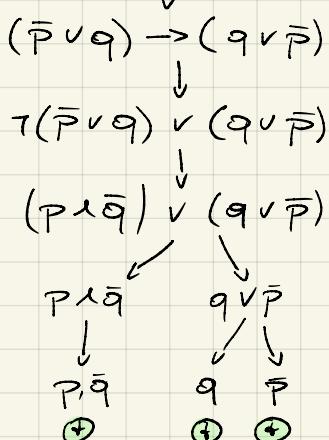
$$\textcircled{3} \quad (P \wedge q) \vee (\neg P \wedge \neg q)$$



$$\textcircled{4} \quad (P \rightarrow q) \rightarrow (q \rightarrow P)$$



$$\textcircled{6} \quad (P \rightarrow q) \rightarrow (\bar{q} \rightarrow \bar{P})$$



5. $(p \Rightarrow q) \Rightarrow (\neg p \Rightarrow \neg q)$
6. $(p \Rightarrow q) \Rightarrow (\neg q \Rightarrow \neg p)$
7. $p \Rightarrow \neg p$
8. $p \equiv \neg p$
9. $(p \equiv q) \equiv (\neg p \equiv \neg q)$

10. $\neg(p \wedge q) \equiv (\neg p \wedge \neg q)$
11. $\neg(p \wedge q) \equiv (\neg p \vee \neg q)$
12. $(\neg p \vee \neg q) \equiv \neg(p \vee q)$
13. $\neg(p \vee q) \equiv (\neg p \wedge \neg q)$
14. $(p \equiv (p \wedge q)) \equiv (q \equiv (p \vee q))$

$$\textcircled{14} \quad (P \equiv (P \wedge Q)) \equiv (Q \equiv (P \vee Q))$$

$$(P \rightarrow (P \wedge Q) \wedge (P \wedge Q) \rightarrow P) \equiv (Q \rightarrow (P \vee Q) \wedge (P \vee Q) \rightarrow Q)$$

$$((\bar{P} \vee (P \wedge Q)) \wedge (\neg(P \wedge Q) \vee P)) \equiv ((\bar{Q} \vee (P \vee Q)) \wedge (\neg(P \vee Q) \vee Q))$$

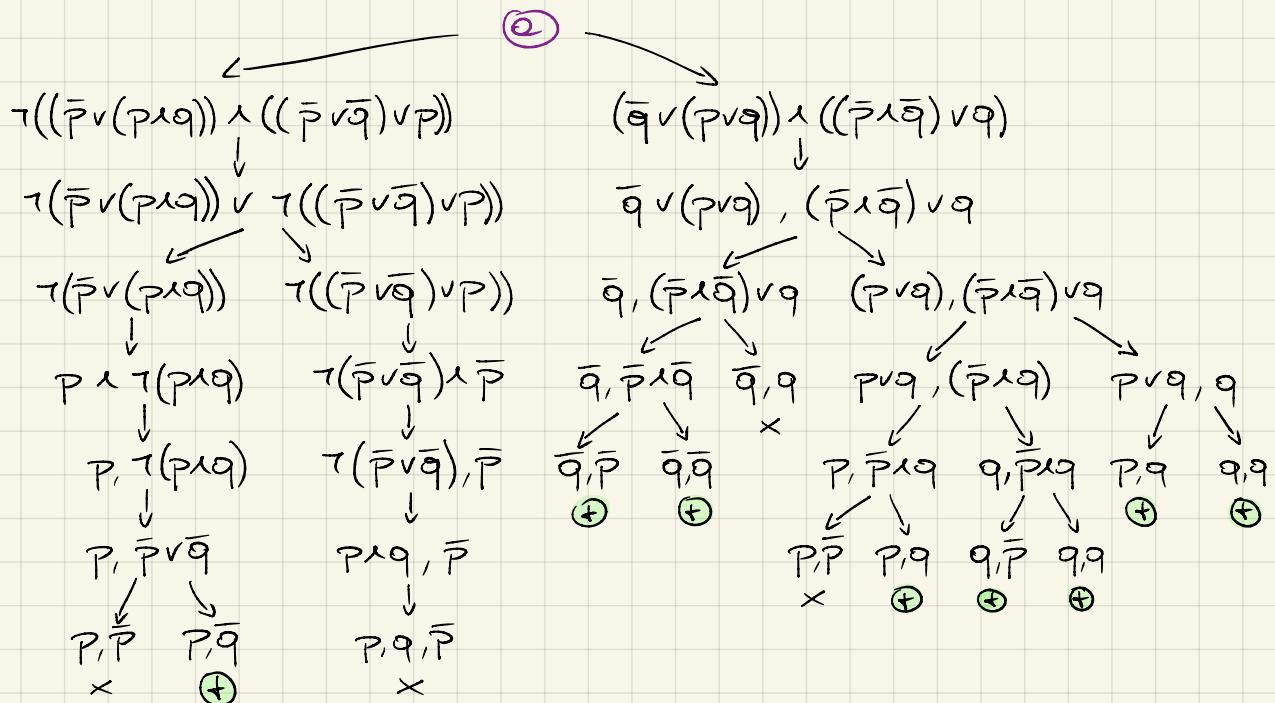
$$((\bar{P} \vee (P \wedge Q)) \wedge ((\bar{P} \vee Q) \vee P)) \rightarrow ((\bar{Q} \vee (P \vee Q)) \wedge ((\bar{P} \wedge Q) \vee Q)) \wedge$$

$$((\bar{Q} \vee (P \vee Q)) \wedge ((\bar{P} \wedge Q) \vee Q)) \rightarrow ((\bar{P} \vee (P \wedge Q)) \wedge ((\bar{P} \vee Q) \vee P))$$

$$(\neg((\bar{P} \vee (P \wedge Q)) \wedge ((\bar{P} \vee Q) \vee P)) \vee ((\bar{Q} \vee (P \vee Q)) \wedge ((\bar{P} \wedge Q) \vee Q))) \wedge = \textcircled{a}$$

$$(\neg((\bar{Q} \vee (P \vee Q)) \wedge ((\bar{P} \wedge Q) \vee Q)) \vee ((\bar{P} \vee (P \wedge Q)) \wedge ((\bar{P} \vee Q) \vee P))) = \textcircled{b}$$

$\textcircled{a}, \textcircled{b}$



\textcircled{b}

$$(3) (P \equiv Q) \equiv (\neg P \equiv \neg Q)$$

- Definability of logical connectives

- $A \equiv B \leftrightarrow (A \rightarrow B) \wedge (B \rightarrow A)$
- $A \rightarrow B \leftrightarrow \neg A \vee B \leftrightarrow \neg(A \wedge \neg B)$
- $A \wedge B \leftrightarrow \neg(\neg A \vee \neg B) \leftrightarrow \neg(A \rightarrow \neg B)$
- $A \vee B \leftrightarrow \neg(\neg A \wedge \neg B) \leftrightarrow \neg A \rightarrow B$

$$((P \rightarrow Q) \wedge (Q \rightarrow P)) \equiv ((\neg P \rightarrow \neg Q) \wedge (\neg Q \rightarrow \neg P))$$

$$(((P \rightarrow Q) \wedge (Q \rightarrow P)) \rightarrow ((\neg P \rightarrow \neg Q) \wedge (\neg Q \rightarrow \neg P))) \wedge (((\neg P \rightarrow \neg Q) \wedge (\neg Q \rightarrow \neg P)) \rightarrow ((P \rightarrow Q) \wedge (Q \rightarrow P)))$$

$$((\neg P \wedge Q \wedge \neg Q \wedge P) \rightarrow (P \wedge \neg Q \wedge Q \wedge \neg P)) \wedge ((P \wedge \neg Q \wedge Q \wedge \neg P) \rightarrow (\neg P \wedge Q \wedge \neg Q \wedge P))$$

X X X

$$(10) \neg(P \wedge Q) \equiv (\neg P \wedge \neg Q)$$

$$(\neg(P \wedge Q) \rightarrow (\neg P \wedge \neg Q)) \wedge ((\neg P \wedge \neg Q) \rightarrow \neg(P \wedge Q))$$

$$(P \wedge Q \wedge \neg P \wedge \neg Q) \wedge (\neg(\neg P \wedge \neg Q) \wedge \neg(P \wedge Q))$$

X ((P \vee Q) \wedge (\neg P \vee \neg Q))

$$(11) (\neg P \vee \neg Q) \equiv \neg(P \vee Q)$$

$$(\neg(P \vee Q) \rightarrow \neg(P \vee Q)) \wedge (\neg(P \vee Q) \rightarrow \neg(P \vee Q))$$

$$((P \vee Q) \vee \neg(\neg P \vee \neg Q)) \wedge ((\neg P \vee \neg Q) \vee \neg(P \vee Q))$$

$$(P \vee Q) \vee \neg(\neg P \vee \neg Q), (\neg P \vee \neg Q) \vee \neg(P \vee Q)$$

$$(P \vee Q), (\neg P \vee \neg Q) \vee \neg(P \vee Q) \quad \neg(\neg P \vee \neg Q), (\neg P \vee \neg Q) \vee \neg(P \vee Q)$$

$$P, Q, (\neg P \vee \neg Q) \vee \neg(P \vee Q) \quad \neg P, \neg Q, (\neg P \vee \neg Q) \vee \neg(P \vee Q)$$

$$P, Q, (\neg P \vee \neg Q) \quad P, Q, \neg(P \vee Q)$$

$$P, Q, (\neg P \vee \neg Q) \quad P, Q, \neg(P \vee Q)$$

$$P, Q, P \quad P, Q, Q$$

✓ ✓

$$\neg P, \neg Q, (\neg P \vee \neg Q) \vee \neg(P \vee Q)$$

$$\neg P, \neg Q, P \quad \neg P, \neg Q, Q$$

$$\neg P, \neg Q, P \quad \neg P, \neg Q, Q$$

$$\neg P, \neg Q, \neg(P \vee Q)$$

$$\neg P, \neg Q, (\neg P \vee \neg Q)$$

$$\neg P, \neg Q, \neg P \quad \neg P, \neg Q, \neg Q$$

✓ ✓

$$(12) \neg(P \vee Q) \equiv (\neg P \wedge \neg Q)$$

$$(\neg P \wedge \neg Q) \equiv (\neg P \wedge \neg Q)$$

$$((\neg P \wedge \neg Q) \rightarrow (\neg P \wedge \neg Q)) \wedge ((\neg P \wedge \neg Q) \rightarrow (\neg P \wedge \neg Q))$$

TAUTOLOGIA

TAUTOLOGIA

(13)

$$G_P \wedge \neg F_{\neg P}$$

$$G_P, \neg F_{\neg P}$$

$$P, \times G_P, \neg F_{\neg P}$$

$$P, \times G_P, P$$

X

$$P, \times G_P, \times F_{\neg P}$$

X

$$G_P, \neg F_{\neg P}$$

step rule

TABLEAUX CTL

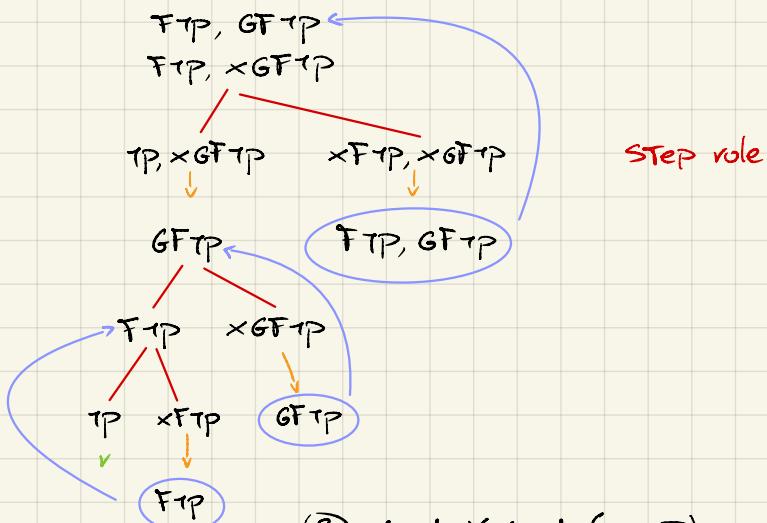
(1) $P \wedge GFTP$

$P, GF\top$

$P, F\top, \times GFTP$

$P, \top, \times GFTP$ \times $P, \times F\top, \times GFTP$

Applies the STEP RULE: evaluations of successive states temporale



(2) $\top \wedge \times \top \wedge (\Diamond UP)$

$\top, \times \top, (\Diamond UP)$

$\top, \times \top, \top$

\times

$\top, \times \top, \Diamond, \times (\Diamond UP)$

step-rule

$\top, (\Diamond UP)$

\top, \top

\times

$\top, \Diamond, \times (\Diamond UP)$

step-rule

$\Diamond UP$

✓

$\Diamond, \times (\Diamond UP)$

✓

$\Diamond UP$

[1 - 2024/01/08]

$P \wedge (P \rightarrow Gq) \wedge \neg F \neg q$

$P, P \rightarrow Gq, \neg F \neg q$

$P, \top \vee Gq, \neg F \neg q$

\times $P, \top, \neg F \neg q$

$P, Gq, \neg F \neg q$

\times $P, q, \times Gq, \neg F \neg q$

$P, q, \times Gq, \times \neg F \neg q$

Step-rule

$Gq, \neg F \neg q$

\leftarrow

\times $q, \times Gq, \neg q$

$q, \times Gq, \times \neg F \neg q$

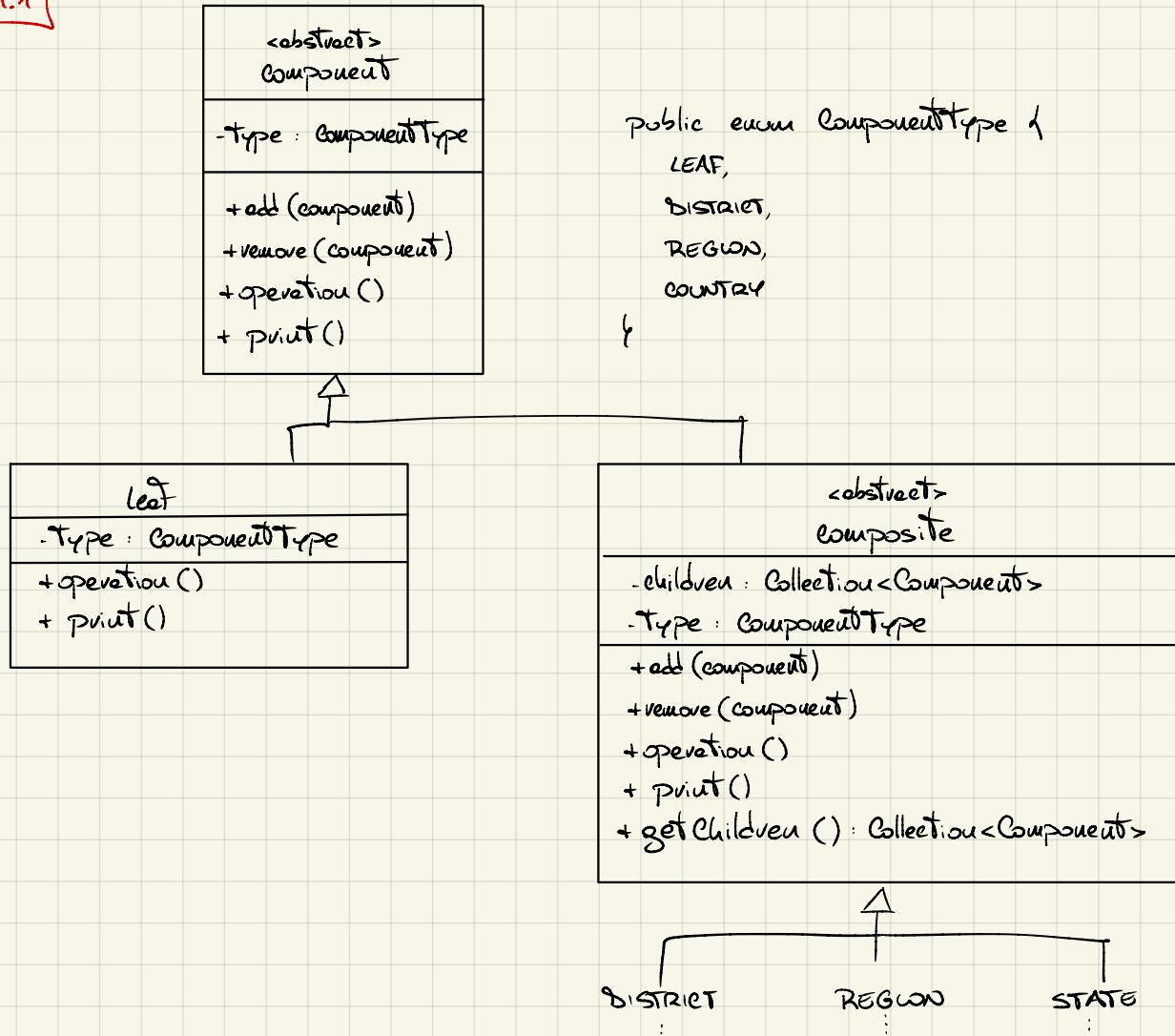
Step-rule

$Gq, \neg F \neg q$

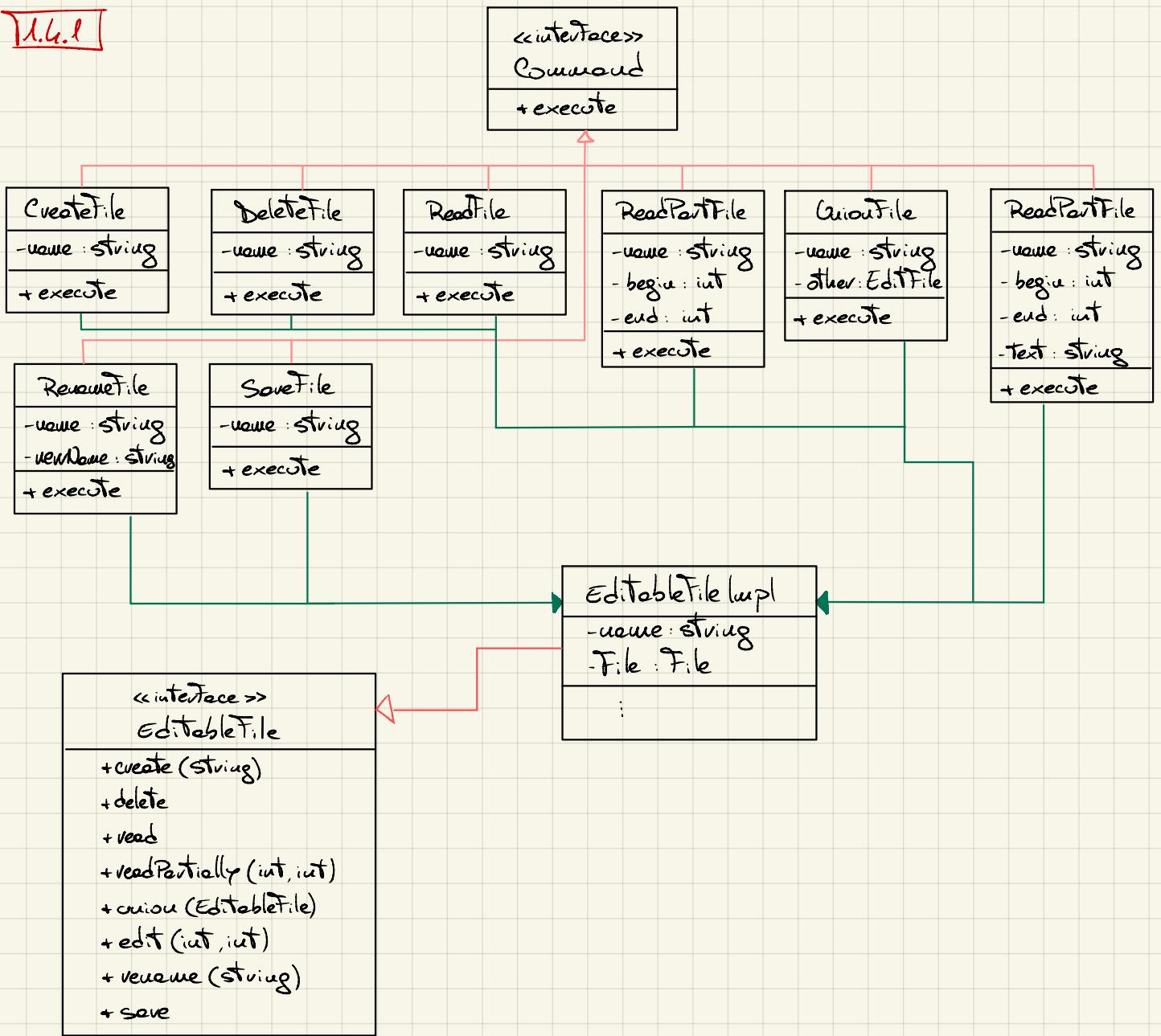
loop-rule

UML

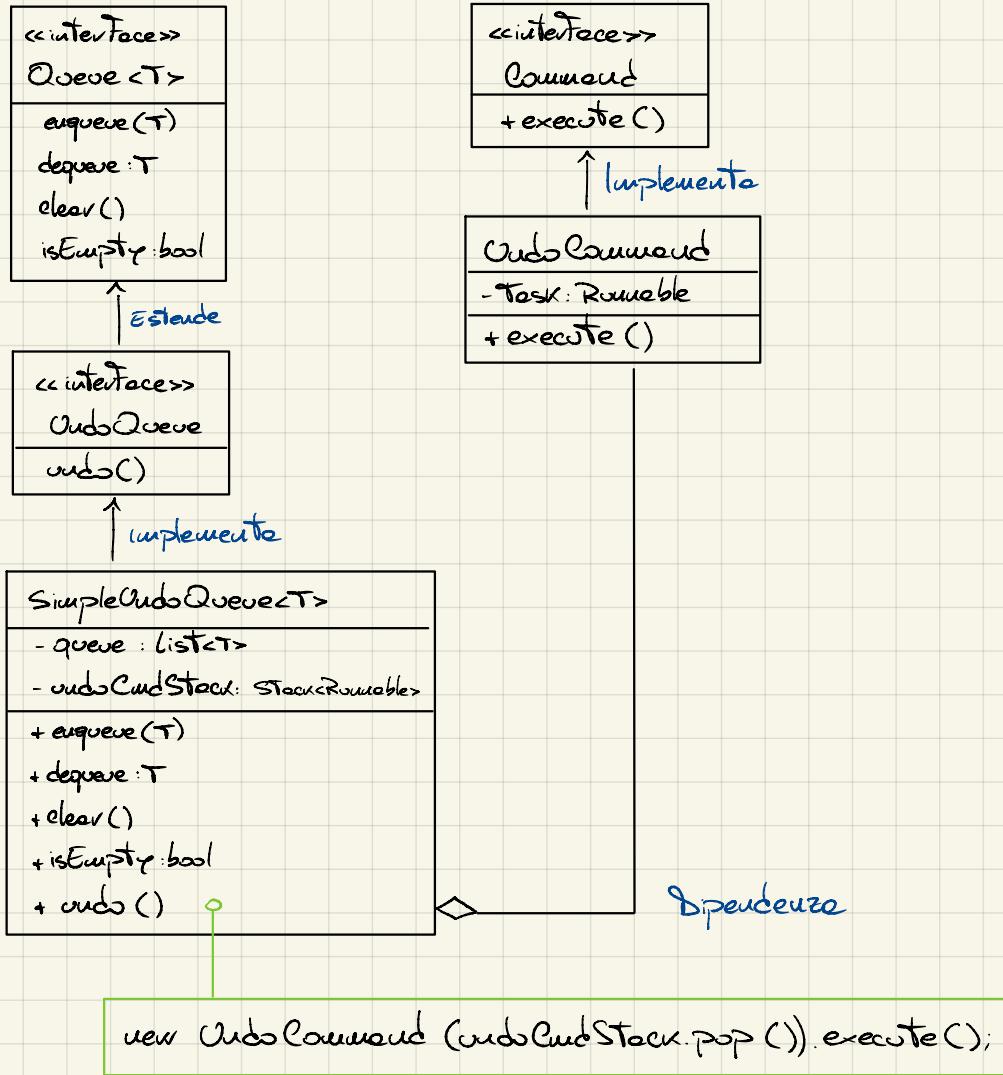
1.1.1

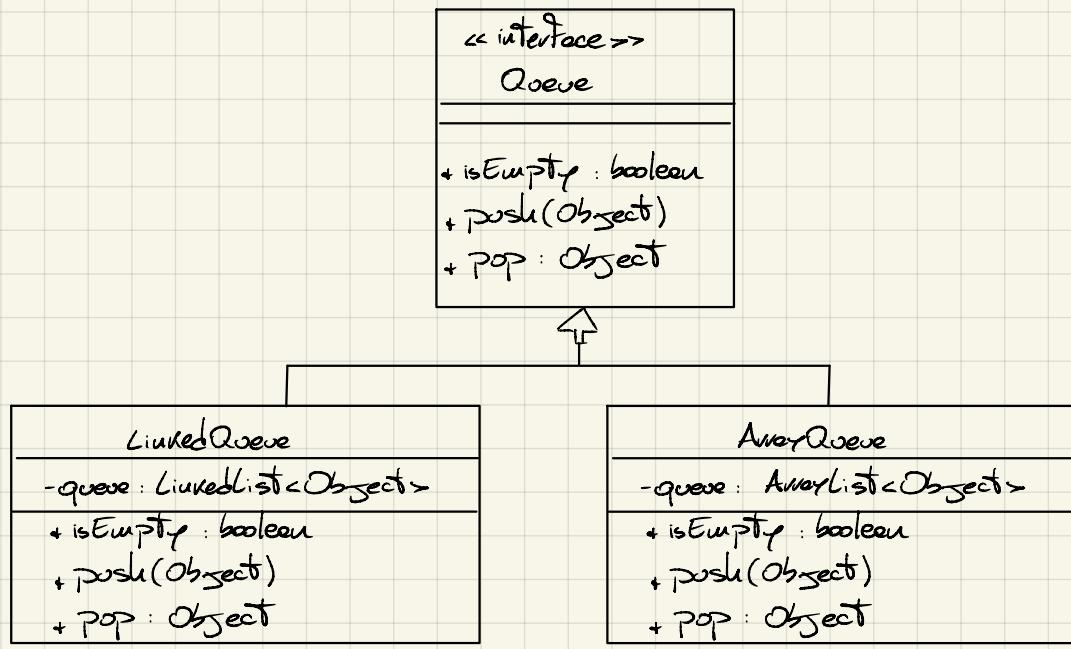


11.6.1



1.4.2





Esame 2023-02-07 es. 3

