

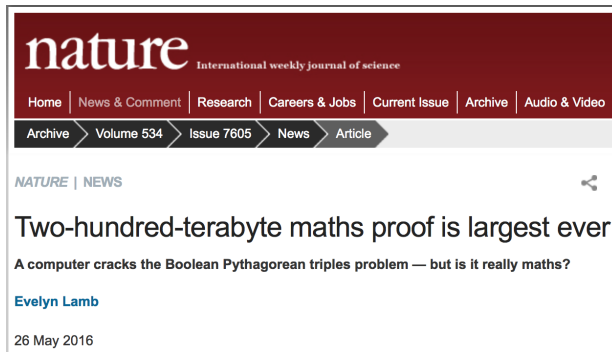
Der DPLL Algorithmus

Christoph Benz Müller
Freie Universität Berlin

Adressierte Themen:

- ▶ Wissensrepräsentation und Schließen
- ▶ Propositionale Logik und SAT Solving
- ▶ Davis-Putnam-Logemann-Loveland (DPLL) Algorithmus

Beispiel einer Erfolgsgeschichte



The screenshot shows the top section of the Nature journal website. The header is dark red with the 'nature' logo in white. Below the logo is the tagline 'International weekly journal of science'. A navigation bar contains links: Home, News & Comment, Research, Careers & Jobs, Current Issue, Archive, and Audio & Video. Below this is a secondary navigation bar with links: Archive, Volume 534, Issue 7605, News, and Article. The 'News' link is highlighted. The main content area has a light blue header with 'NATURE | NEWS' and a share icon. The article title is 'Two-hundred-terabyte maths proof is largest ever'. The subtitle is 'A computer cracks the Boolean Pythagorean triples problem — but is it really maths?'. The author is 'Evelyn Lamb'. The date is '26 May 2016'.

nature
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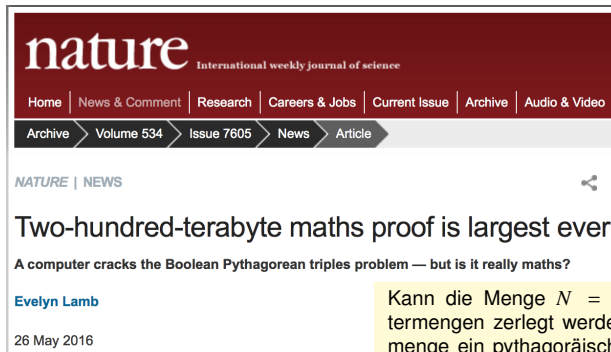
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Evelyn Lamb

26 May 2016

Beitrag von
M. Heule
O. Kullmann
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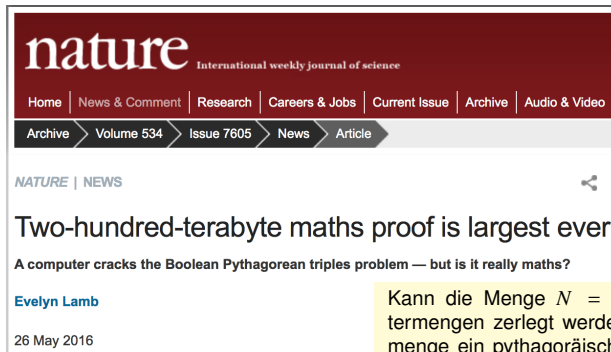
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$n = 10$

$$3^2 + 4^2 = 5^2$$

(wähle die Farbe der anderen Zahlen beliebig)



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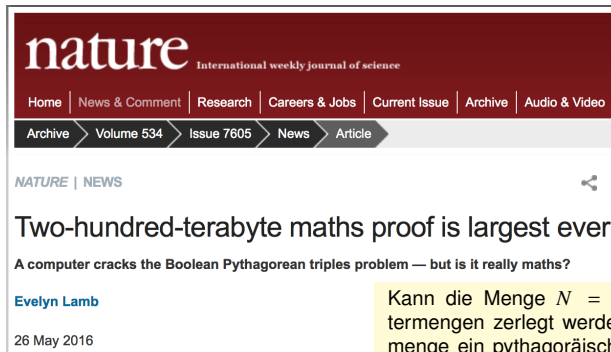
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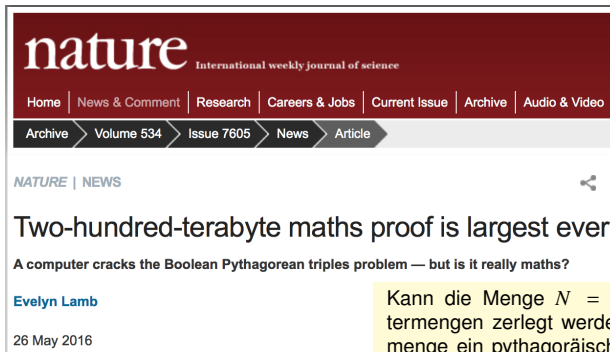
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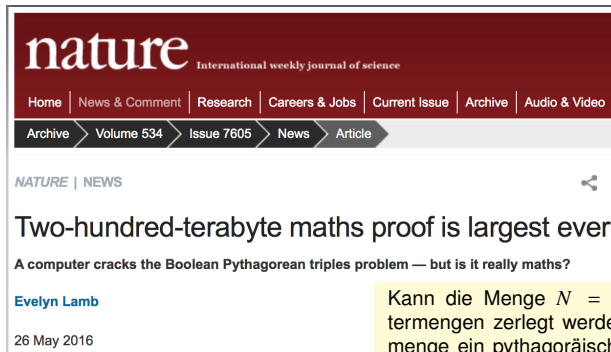
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Verboten: nur eine Farbe!



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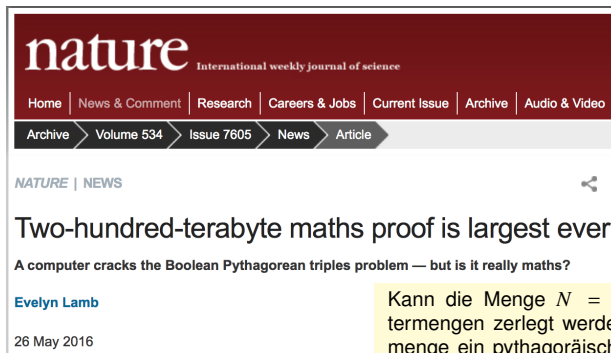
$n = 20$

$$3^2 + 4^2 = 5^2$$

$$5^2 + 12^2 = 13^2$$

$$8^2 + 15^2 = 17^2$$

(wähle die Farbe der anderen Zahlen beliebig)



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$n = 30$


$$3^2 + 4^2 = 5^2$$

$$5^2 + 12^2 = 13^2$$

$$8^2 + 15^2 = 17^2$$

$$7^2 + 24^2 = 25^2$$

(choose color of the other numbers arbitrarily)



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$n = 40$

$$3^2 + 4^2 = 5^2$$

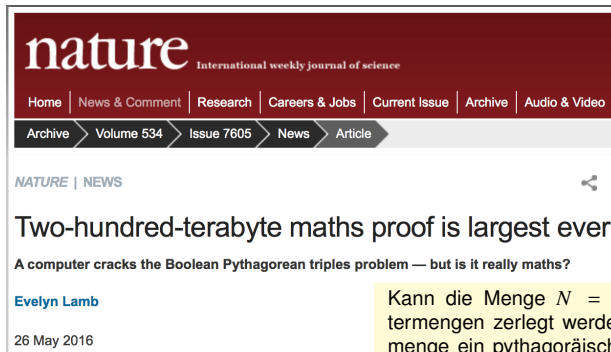
$$5^2 + \boxed{12}^2 = 13^2$$

$$8^2 + 15^2 = 17^2$$

$$7^2 + 24^2 = 25^2$$

$$20^2 + 21^2 = 29^2$$

$$\boxed{12}^2 + 35^2 = 37^2$$



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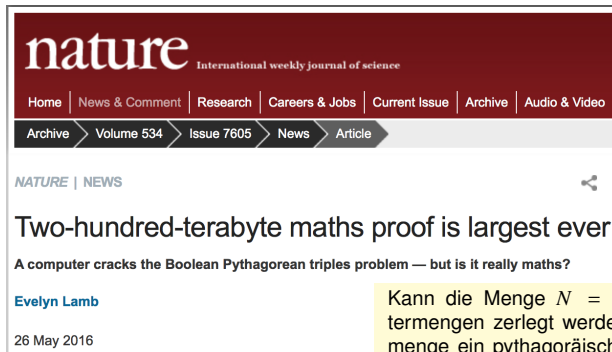
$$8^2 + 15^2 = 17^2$$

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Shown by SAT-Solver:

For $n \geq 7825$ consistent bi-coloring becomes impossible.

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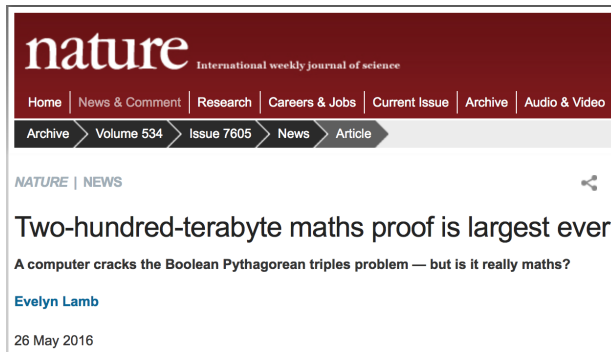
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Beispiel einer Erfolgsgeschichte



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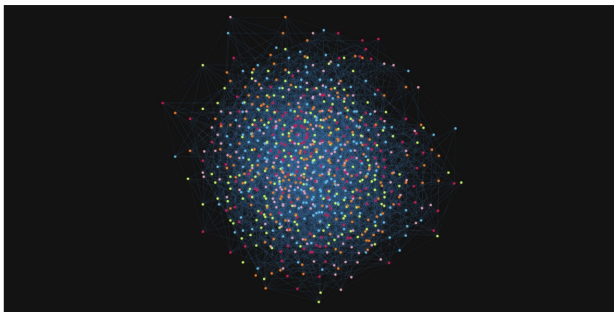
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The Science of Brute Force, M.J.H. Heule, O. Kullmann, Communications of the ACM, Vol. 60 No. 8, Pages 70-79, 2017, DOI:10.1145/3107239

<https://cacm.acm.org/magazines/2017/8/219606-the-science-of-brute-force/fulltext>

EVELYN LAMB SCIENCE 04.30.18 09:00 AM

AN ANTI-AGING PUNDIT SOLVES A DECADES-OLD MATH PROBLEM



This 826-vertex graph requires at least five colors to ensure that no two connected vertices are the same shade. (Click [here](#) for a high-resolution version.)

 OLENA SHMAHALO/QUANTA MAGAZINE; SOURCE: [MARIJN HEULE](#)

Übergeordnetes Thema: Erfüllbarkeitsproblem (SAT) der Aussagenlogik

- ▶ **P vs. NP** (1 Million Dollar Frage, Clay Mathematics Institute)
- ▶ **SAT** ist **NP-vollständig**
- ▶ **SAT-Solver** trotzdem sehr erfolgreich in der Praxis

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- ▶ Literatur
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Syntax Aussagenlogik

$$s, t ::= \top \mid \perp \mid A \mid \neg s \mid s \vee t \mid s \wedge t \mid s \rightarrow t \mid s \leftrightarrow t$$

Semantik Aussagenlogik: Abbildung nach $T(\text{true})$ oder $F(\text{false})$

s	t	\top	\perp	$\neg s$	$s \vee t$	$s \wedge t$	$s \rightarrow t$	$s \leftrightarrow t$
T	T	T	F	F	T	T	T	T
T	F	T	F	F	T	F	F	F
F	T	T	F	T	T	F	T	F
F	F	T	F	T	F	F	T	T

Klauselnormalform bzw. Konjunktive Normalform (CNF)

Beispielformel:

$$(A \wedge \neg B) \leftrightarrow (A \vee B)$$

Beispielformel in CNF:

$$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$$

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$$s, t ::= \top \mid \perp \mid A \mid \neg s \mid s \vee t \mid s \wedge t \mid s \rightarrow t \mid s \leftrightarrow t$$

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s	t	\top	\perp	$\neg s$	$s \vee t$	$s \wedge t$	$s \rightarrow t$	$s \leftrightarrow t$
T	T	T	F	F	T	T	T	T
T	F	T	F	F	T	F	F	F
F	T	T	F	T	T	F	T	F
F	F	T	F	T	F	F	T	T

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Notation: Konjunktion von Klausel, Klauseln, Literale

CNF

$$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$$

Notation für Klauseln

$$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$$

Notation für Klausel-Listen

$$A\bar{B}, \bar{A}\bar{B}, \bar{B}$$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

 $[A\bar{B}]$ repräsentiert die **Belegung** $\{A \rightarrow \text{T}, B \rightarrow \text{F}\}$ $[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$ $[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s $[\psi]$ wird dann auch als **Modell für** s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF

$$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$$

Notation für Klauseln

$$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$$

Notation für Klausel-Listen

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CNF

$$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$$

Notation für Klauseln

$$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$$

Notation für Klausel-Listen

$$A\bar{B}, \bar{A}\bar{B}, \bar{B}$$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

 $[A\bar{B}]$ repräsentiert die **Belegung** $\{A \rightarrow \text{T}, B \rightarrow \text{F}\}$ $[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$ $[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s $[\psi]$ wird dann auch als **Modell** für s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF

$$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$$

Notation für Klauseln

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Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
\square	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für “Solved”?

$[\bar{B}C] \quad \underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark} \quad \text{—alle Klauseln sind erfüllt—}$

(es gilt dann: $[\bar{B}C] \models \text{Eingabeformel}$)

Solved-Regel

$[\psi] \quad \phi \quad (\text{Solved})$

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
\square	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
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	Eingabeformel	(CNF & Initialisierung)
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Solved-Regel

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DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
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Solved-Regel

$[\psi] \quad \phi \quad (\text{Solved})$

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{FG}, \cancel{\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{F}G}, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Unit-Propagation-Regel:

$[\psi] \quad \phi, \varphi L \quad (\text{Unit-Propagation})$

Bedingung:

\downarrow

$[\psi] \models \neg\varphi$

$L \notin [\psi]$

$[\psi L] \quad \phi, \varphi L$

Verarbeite neue Belegungsinformation

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[\]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Pure-Literal-Regel

$[\psi] \quad \phi, \varphi L \quad (\text{Pure-Literal})$

Bedingung:

↓

L nur mit einheitlicher Polarität in $\phi, \varphi L$

L undefiniert in $[\psi]$

$[\psi L] \quad \phi, \varphi L$

Verarbeite neue Belegungsinformation

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, \cancel{C}\bar{G}F, \bar{C}\bar{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\bar{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, \cancel{C}\bar{G}F, \bar{C}\bar{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\bar{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, \cancel{C\bar{G}F}, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

Split-Regel:

$[\psi] \quad \phi \quad (\text{Split})$

Bedingung:

\downarrow

L und \bar{L} kommen in ϕ vor

L undefiniert in $[\psi]$

$[\psi L_b] \quad \phi$

Verarbeite neue Belegungsinformation

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{F}G, \cancel{\bar{F}}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{F}}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{F}}G, \cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{F}G, \cancel{\bar{F}}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{F}}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{F}}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[\]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[\]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, \cancel{BCF}, \cancel{C\bar{G}F}, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, \cancel{BCF}, \cancel{C\bar{G}F}, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

Backtrack Rule:

$[\psi L_b \psi'] \quad \phi, \varphi \quad (\text{Backtrack})$

Bedingung:

\downarrow

$[\psi L_b \psi'] \models \neg \varphi$

ψ' enthält keine mit “b” markierten Literale

$[\psi \bar{L}] \quad \phi, \varphi$

Verarbeite neue Belegungsinformation

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[\]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Solved-Regel

$[\psi] \quad \phi \quad (\text{Solved})$

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(CNF & Initialisierung)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Split)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
		(Solved)

Fail-Regel:

$[\psi] \quad \phi, \varphi \quad (\text{Split})$

Bedingung:

\downarrow

$[\psi] \models \neg\varphi$

ψ enthält keine Backtrack-Literale

$[] \quad \text{Fail}$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{BCF}, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}FG}, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}G}, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}\bar{F}G}, \bar{C}FG, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Abstrakter DPLL Algorithmus (Regelbasierte Darstellung)

Wende die Regeln erschöpfend an mit folgender Priorität:

1. Solved
2. Fail
3. Backtrack
4. Unit-Propagation
5. Pure-Literal
6. Split

DPLL Algorithmus am Beispiel — Kurzes Beispiel, alle Regeln

[]	an , ãn , ãñ , bn	(Pure Literal)
[b]	an , ãn , ãñ , bn	(Split)
[ba]	an , ãn , ãñ , bn	(Unit Propagation)
[ban]	an , ãn , ãñ , bn	(Widerspruch: $n \wedge \neg n$, Backtracking)
[bã]	an , ãn , ãñ , bn	(Unit Propagation)
[bãn]	an , ãn , ãñ , bn	(Solved)

Möglichkeiten zur weiteren Verbesserung bzw. Optimierung

- ▶ Heuristiken für Split: z.B. wähle das am häufigsten vorkommende Literal (Vorheriges Beispiel: wähle F zuerst – diese Wahl verhindert Backtracking und generiert eine alternative Belegung (Übungsaufgabe))
- ▶ Nicht-chronologisches Backtracking
- ▶ Klausel-Lernen beim Backtracking
- ▶ Effiziente Datenstrukturen
- ▶ Indexing-Techniken, Watchlist
- ▶ ...

Korrektheit und Vollständigkeit: für abstraktes System in Vorlesung

Systeme (z.B. zChaff, MiniSat, PicoSat, Limmat, Lingeling)

Anwendungsbeispiele

Satisfiability modulo Theories