Algoritam za izracunavanje zatvaraca

1. **F = {AB->AC, CD->E, A->B, AE->F}**

AB->A   AB->C

ZATVARAC
$(AD)^+$ = AD
$(AD)^+$ = ADB (A->B)
$(AD)^+$ = ADBC (AB->C)
$(AD)^+$ = ADBCE (CD->E)
$(AD)^+$ = ADBCEF (AE->F)

2. **F = {AB->C, C->A, BC->D, ACD->B, D->EG, BE->C, CG->BD, CE->AG}**

D->E D->G
CG->B CG->D
CE-> A CE->G

$(BD)^+$ = BDEGCA

3. **F = {A->B, A->C, A->E, D->C, E->I, BI->J}**

$(AI)^+$ = AIBCEJ
$(DJ)^+$ = DJC
$(BE)^+$ = BEIJ

Algoritam za trazenje kljuca

1. **R = {A, B, C, D, E}**
   F = {AB->CDE, E->A, CD->B}

AB->C, AB->D, AB->E
$(ABCDE)^+$ = ABCDE = R /E
$(ABCD)^+$ = ABCDE = R/D
$(ABC)^+$ = ABCDE = R /C
$(AB)^+$ = ABCDE = R /B

$(A)^+ = A$
$(B)^+ = B$

K = {AB, EB, ACD, ECD}

2. **U = {A, B, C, D, E, F},**
   F={AB->C, C->A, C->D, AB->E, AB->F, E->F}

$(ABCDEF)^+ = ABCDEF = U$ /F
$(ABCDE)^+ = ABCDEF = U$ /E
$(ABCD)^+ = ABCDEF = U$ /D
$(ABC)^+ = ABCDEF = U$ /C
$(AB)^+ = ABCDEF = U$ /B
$(A)^+ = A$
$(B)^+ = B$

K = {AB, CB, ...}

3. **F = {AB->CE, C->B, ED->F, F->G}**
   R={A, B, C, D, E, F, G, H}

H i D svakako mora jer se ne pojavljuje na desnim stranama FZ
$(ABCDEFGH)^+ = ABCDEFGH$ /G
$(ABCDEFH)^+ = ABCDEFGH$ /F
$(ABCDEH)^+ = ABCDEFGH$ /E
$(ABCDH)^+ = ABCDEFGH$ / C
$(ABDH)^+ = ABCDEFGH$ /B
$(ADH)^+ = ADH$
$(BDH)^+ = BDH$

K = {ABDH, ACDH..}

Dokazivanje da je fz logicka posledica skupa fz prema Armstrongovim pravilima

1. **F = {A->B, B->C, AC->D, BD->E, C->E}**
   U= {A, B, C, D, E}

a. **F |= A->D ovo treba dokazati.**

$(A)^{+} = ABCDE$

$$\left.\begin{array}{l} A \to B \\ B \to C \end{array}\right\} \Rightarrow A3 \quad \left.\begin{array}{l} A \to C \\ A \in U \end{array}\right\} \Rightarrow A2 \quad \left.\begin{array}{l} A \to AC \\ AC \to D \end{array}\right\} \Rightarrow A3 \quad A \to D$$

b. **F |= AD->E ovo treba dokazati.**

prvo zatvarac nad AD

$(AD)^{+} = ABCDE$

$$\left.\begin{array}{l} A \to B \\ D \in U \end{array}\right\} \Rightarrow A2 \quad \left.\begin{array}{l} AD \to BD \\ BD \to E \end{array}\right\} \Rightarrow A3 \quad AD \to E$$

2. **F= { A -> F, AB -> CE, AC ->D, EB ->D, D->A , F->AE}**
   U={A, B, C, D, E, F}
   AB->C, AB->E, F->A, F->E

a. **F |= AB->D ovo treba dokazati.**

prvo zatvarac nad AB

$(AB)^{+} = ABFCED$

$$\left.\begin{array}{l} AB \to E \\ EB \to D \end{array}\right\} \Rightarrow A3 \quad EB \to D$$

$$\left.\begin{array}{l} AB \to E \\ B \in U \end{array}\right\} \Rightarrow A2 \quad \left.\begin{array}{l} AB \to EB \\ EB \to D \end{array}\right\} \Rightarrow A3 \quad AB \to D$$

3. **F={AB->C, C->A, BC->D, ACD->B, D->EG, BE->C}**
   U={A, B, C,D, E, F, G}
   D->E, D->G, CG->B, CG->D, CE->A, CE->G

a. **F |= CE->B ovo treba dokazati.**

prvo zatvarac nad CE

$(CE)^{+} = ABCDEFG$

$$\left.\begin{array}{l} CE \to G \\ C \in U \end{array}\right\} \Rightarrow A2 \quad \left.\begin{array}{l} CE \to CG \\ CG \to B \end{array}\right\} \Rightarrow A3 \quad CE \to B$$

b. **F |= BD->C ovo treba dokazati.**

prvo zatvarac nad BD

$(BD)^{+} = ABCDEFG$

$$\left.\begin{array}{l} D \to E \\ B \in U \end{array}\right\} \Rightarrow A2 \quad \left.\begin{array}{l} BD \to BE \\ BE \to C \end{array}\right\} \Rightarrow A3 \quad BD \to C$$

c. **F |= CE->D ovo treba dokazati.**

prvo zatvarac nad CE

$(CE)^{+} = ABCDEFG$

$$\left.\begin{array}{l} CE\text{->}G \\ C\in U \end{array}\right\} \Rightarrow_{A2} \quad \left.\begin{array}{l} CE\text{->}CG \\ CG\text{->}D \end{array}\right\} \Rightarrow_{A3} \quad CE\text{->}D$$

d. **F |= ABG->E ovo treba dokazati.**

prvo zatvarac nad ABG

$(ABG)^{+} = ABCDEFG$

$$\left.\begin{array}{l} AB\text{->}C \\ G\in U \end{array}\right\} \Rightarrow_{A2} \quad \left.\begin{array}{l} ABG\text{->}CG \\ CG\text{->}D \end{array}\right\} \Rightarrow_{A3} \quad \left.\begin{array}{l} ABG\text{->}D \\ D\text{->}E \end{array}\right\} \Rightarrow_{A3} \quad ABG\text{->}E$$

e. **F |= CD->B ovo treba dokazati.**

prvo zatvarac nad CD

$(CD)^{+} = ABCDEFG$

$$\left.\begin{array}{l} D\text{->}G \\ C\in U \end{array}\right\} \Rightarrow_{A2} \quad \left.\begin{array}{l} CD\text{->}CG \\ CG\text{->}B \end{array}\right\} \Rightarrow_{A3} \quad CD\text{->}B$$

f. **F={AB->AC, CD->E, A->B, AE->F}**

U={A, B, C, D, E, F}

F |= AD->F ovo treba dokazati.

prvo zatvarac nad AD

$(AD)^{+} = ABCDEF$

A->B A∈U	}=>A2	A->AB AB->C	}=>A3	A->C D∈U	}=>A2	AD->CD CD->E	}=>A3	AD->E A∈U
}=>A2	AD->AE AE->F	}=>A3	AD->F					