1) KLOC = 320 KLOC

KLOC > 300 so Embedded mode

i) Basic model

Effort (E) = $a_i (KLOC)^{b_i}$

Development Time (D) = $c_i (E)^{d_i}$

for Embedded mode, $a_i = 3.6$, $b_i = 1.2$, $c_i = 2.5$, $d_i = 0.32$

$E = 3.6 (320)^{1.2}$

$E = 3651.59$ PM

$D = 2.5 (3651.59)^{0.32}$

$D = 2.5 \times 13.80$

$D = 34.50$ M

$D \approx 35$ M

Persons Employed = $\frac{E}{D}$

$= \frac{3651.59}{34.50} = 105.84$ Persons

Persons Employed $\approx$ 106 persons

ii) Intermediate model

Effort (E) = $a_i (KLOC)^{b_i} \times EAF$

For embedded mode $a_i = 2.8$, $b_i = 1.2$, $c_i = 2.5$, $d_i = 0.32$

EAF = 1.08 × 0.7 × 0.82 × 0.95

EAF = 0.632

1.08 → high data

0.7 → less complex

0.82 → high applicant experience

0.95 → high language experience

EAF = 1.16 × 0.7 × 0.82 × 0.95

EAF = 0.632

EAF =

$E = 2.8 \times (320)^{1.2} \times 0.68$

$E = 1789.28$ PM

Development Time $(D) = 2.5 \times (1789.28)^{0.32}$

$D = 27.466$

$D \approx 28$ M

EAF

i) Very High Data

ii) Low Complex

iii) Very High Experience

iv) High language Experience

Persons Employed $= \frac{E}{D}$

$SS = \frac{1789.28}{27.466}$

$SS = 65.14$

$SS \approx 65$ persons

2) KLOC = 145KLOC

Organic mode

Effort $(E) = a_i (KLOC)^{b_i}$

Development Time $(D) = c_i (E)^{d_i}$

$a_i = 2.4$, $b_i = 1.05$, $c_i = 2.5$, $d_i = 0.38$

$E = 2.4 (145)^{1.05}$

$E = 446.32$ PM

$D = 2.5 (446.32)^{0.38}$

$D = 25.39$ M

$D \approx 26$ M

Average SS = $\frac{E}{D}$

$= \frac{446.32}{25.39} = 17.57$

SS ≈ 18 persons

ii) Semidetached

$a_i = 3.0$, $b_i = 1.12$, $c_i = 2.5$, $d_i = 0.35$

Effort (E) = $a_i (KLOC)^{b_i}$

$E = 3.0 \times (745)^{1.12}$

E = 790.41

Development Time $D = c_i (E)^{d_i}$

$D = 2.5 (790.41)^{0.35}$

D = 25.83

D ≈ 26 M

Average SS = $\frac{E}{D}$

$= \frac{790.41}{25.83} = 30.60$

SS ≈ 31 persons

iii) Embedded

$a_i = 3.6$, $b_i = 1.2$, $c_i = 2.5$, $d_i = 0.32$

Effort (E) = $a_i (KLOC)^{b_i}$

$E = 3.6 (145)^{1.2}$

E = 1412.35

Development Time (D) = $2.5 \times (1412.35)^{0.32}$

=

D = 25.46

D ≈ 26 M

Average SS = $\frac{E}{D}$

= $\frac{1412.35}{25.46}$ = 55.47

SS ≈ 56 persons

3) KLOC = 300 KLOC

KLOC ≈ 300, ~~Embedded mode~~ Semi detached mode

Effort (E) = $a_i \times (KLOC)^{b_i} \times EAF$

$a_i = 3.0$, $b_i = 1.12$, $c_i = 2.5$, $d_i = 0.35$

$E = 3 \times (300)^{1.12} \times EAF$

EAF = 1.08 × 1.08

EAF = 1.1664

$E = 3 \times (300)^{1.12} \times 1.1664$

E = 2081.34 PM

Development Time (D) = $c_i (E)^{d_i}$

$= 2.5 (2081.34)^{0.35}$

D = 36.25 M

D ≈ 37 M

Average SS = $\frac{E}{D} = \frac{2081.34}{36.25}$

= 57.41

SS ≈ 57 persons

Productivity = $\frac{KLOC}{E}$

$= \frac{300}{208.34} = 0.096 \frac{KLOC}{PM}$

Productivity = 96 LOC / PM

4) KLOC = 500 KLOC

KLOC > 300 So embedded mode

$E = a_i (KLOC)^{b_i}$

$E = 2.8 (500)^{1.2}$

E = 4852 PM

Case-1

EAF = 0.82 × 1.14

= 0.9348

E = 4852 × 0.9348

E = 4535.64

$D = c_i (E)^{d_i}$

$D = 2.5 (4535.64)^{0.32}$

D = 36.98

D ≈ 37M

Case-2

EAF = 1.29 × 0.95

= 1.022

E = 4852 × 1.22

E = 5919.44

$D = 2.5 \times (5919.44)^{0.32}$

$D = 40.27$

$D \approx 41$ M

Case-2 requires more effort and time, so low quality developers with lot of programming could not match with other case

05) Size = 301 KLOC
(Embedded mode)

Scale factors value

i) High pereedentness
ii) high development flexibility

All other normal

3) High reliability
4) reduces data base size
5) high denal capability
6) High analyst skill

$EAF = 1.40 \times 1 \times 0.86 \times 0.56$

$= 1.035$

Effort $E = a_i (KLOC)^{b_i} \times EAF$

$= 2.5 \times (301)^{1.10} \times 1.035$

$E = 2731.35$ PM