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2010 .

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NGN (Next Generation Network)

TeleManagement Forum.

E.800,
Agreement (SLA)

Service Level

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SLA.

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SLA

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NGOSS

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• - 2006 – 2010 ..
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FRUCT EUROCON 2009 . 2006–2010 ..
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48

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New

Generation Operations System and Software (NGOSS)
TeleManagement Forum,

SLA

TMF,

(1).

$$\min \sum_r P_r \cdot t_{CTPSr} \Big|_{v \leq V_{max}} \quad (1)$$

$P_r -$
 $r, v -$

$r, t_{CTPSr} -$

(); $V_{max} -$

NGOSS, (1),

F

$$V = F(t_{CTPS_r}). \quad (2)$$

F

()

§2.1

Telecom Applications Map (). eTOM

enhanced

- $r = 1 \dots R -$;
- $t_{CTPS_r} -$;
- $k -$;
- $j -$;

j .

Architecture (TNA)

NGOSS.

Technology Neutral . 1.

Application programming interface (API).

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(.1).

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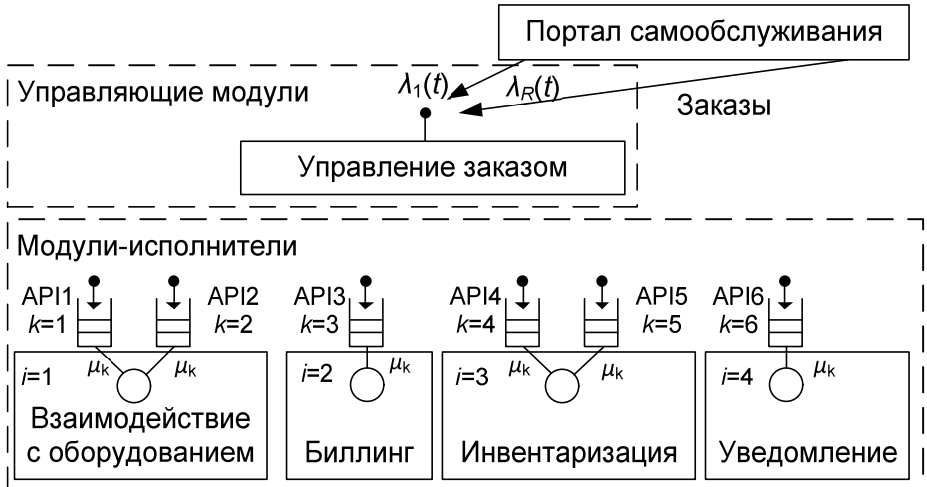
»,

(/ /). . 1 «

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$\mu_k(t)$, R

-



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. 1

i

API.

«

k

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()

j

$X_k(j)$.

$n(x)$

x .

- :
 - $r(t) -$ r
 - $i = 1 \dots I -$ $t;$
 - $Q_k(t) -$ k ; $t;$
 - $n(k) -$ $k;$
 - $X_k(j)$ j $k.$
 §2.2

(, , NP-)

() ,

§2.3

$$\lim_{t \rightarrow \infty} \frac{S_{k(t)}}{t} = \mu_k; \tag{3}$$

$$\lim_{n \rightarrow \infty} \frac{kk'(n)}{n} = P_{kk'}; \tag{4}$$

$$\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{j=1}^n X_k(j)^{1+\varepsilon} \leq C, \varepsilon > 0, C < \infty, \tag{5}$$

$S_k(t)$ k $t; \mu_k$
 $k, \frac{kk'(n)}{k}$
 k', n ; $P_{kk'}$ -
 j $k.$; $X_k(j)$

$$u_k(t), k=1, \dots, K$$

$$\min \int_{s=0}^t \sum_{r=1}^R (\lambda_{beg(r)}(s-t_{CTPS r}) - \mu_{end(r)} \cdot u_{end(r)}(s)) ds \quad (6)$$

$$\int_0^t R \cdot u(s) ds - F \cdot x(t) \leq -q(0) + q(t), \quad (7)$$

$$A \cdot u(t) \leq 1, \quad (8)$$

$$x(t), u(t) \geq 0, t \in (0, T), \quad (9)$$

$$R_{k'k} = \begin{cases} \mu_k & k' = k, \\ -\mu_k P_{kk'} & k' \neq k, \end{cases} \quad (10)$$

$$u_k(t) = \begin{cases} k & , \\ r & , \end{cases} \quad t; \begin{cases} beg(r) & end(r) - n(k) \\ ; - & \end{cases} \quad I \times K, I$$

$$x(t) (\quad) ; F -$$

I , R .2.

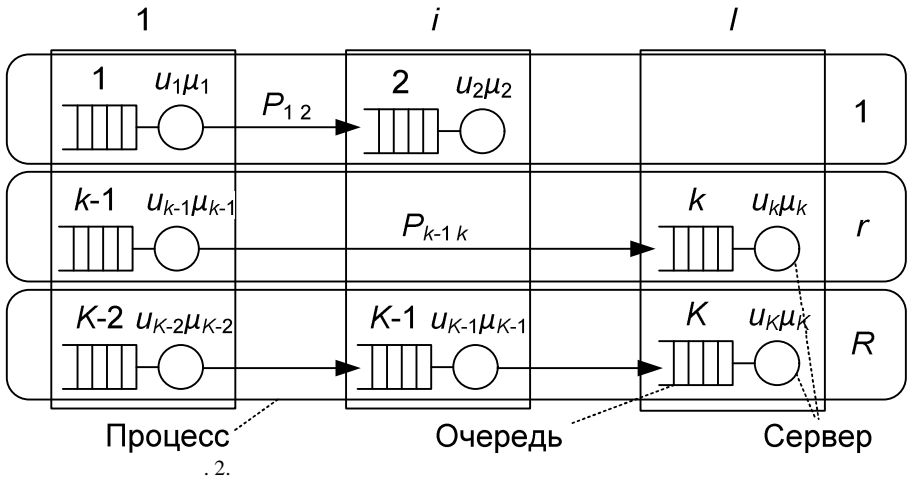
$$u_k \mu_k, \quad P_{kk'} \quad k' k.$$

(6)-(10)

Nazarathy

Weiss

(6),



(6)-(10),

$$0=t_0 < t_1 < \dots < t_m = T, \quad m$$

$$u_k(t).$$

§2.4

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$$(N, N\mu_i) \quad N, \quad N_{is}, \quad N$$

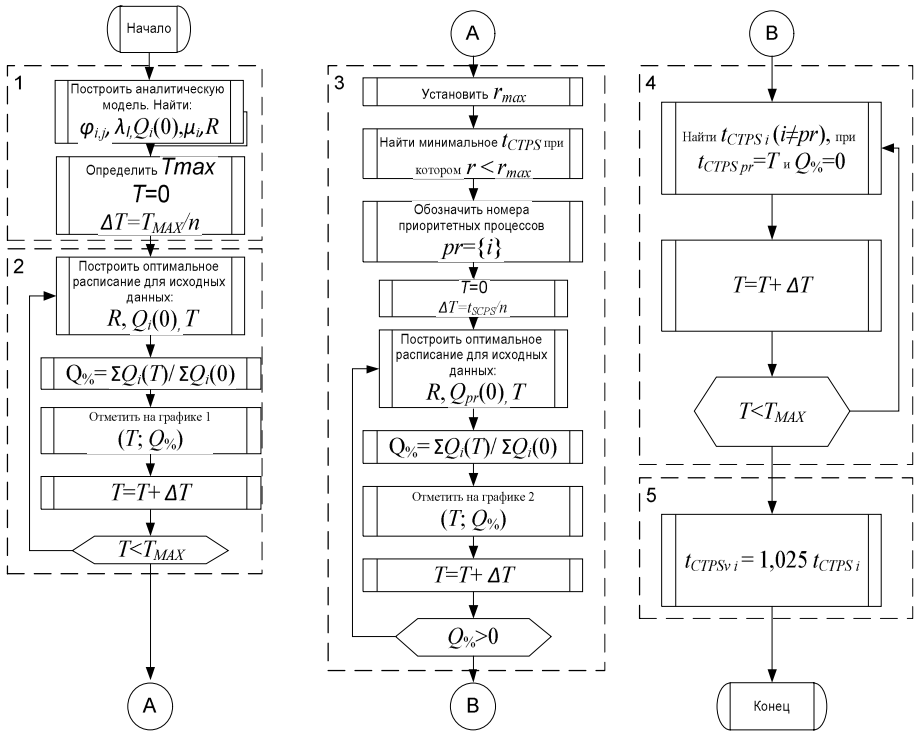
§2.5

$$2,5\% \quad t_{CTPSr}$$

4.

$$t_{CTPSvr} = 1,025 t_{CTPSr} \quad (11)$$

§2.6



. 3.

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P_r .

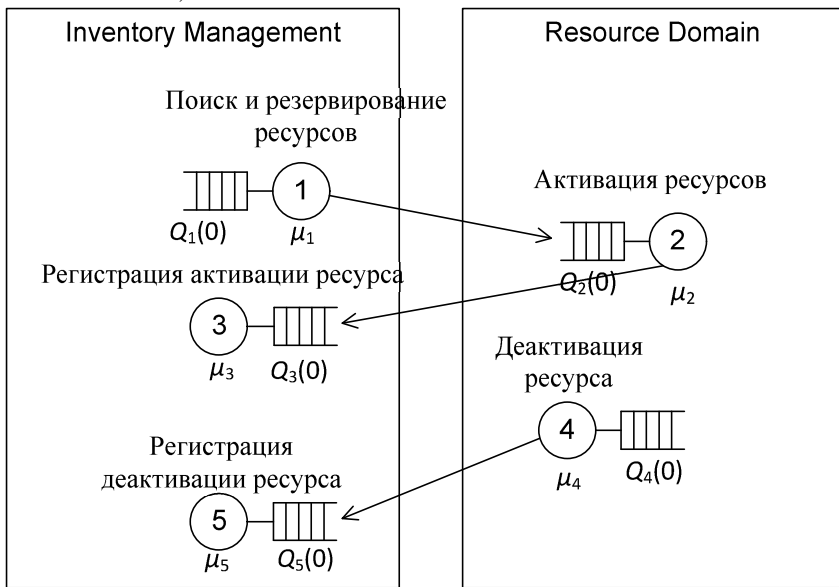
$t_{CTPS_{vi}}$;

. 3.

SLA

.2

. 4,



.4.

. 4.

:

- $I = 2;$
- $K = 5;$
- $n(1) = 1; n(2) = 2;$
- $n(3) = 1; n(4) = 2; n(5) = 1;$
- $1 \quad 2,$
- $3. \quad 4 \quad 5.$
- $1,2(l) = 2,3(l) = 4,5(l) = 1.$
- ;

- $\mu_1 = 1,7; \mu_2 = 0,65; \mu_3 = 2; \mu_4 = 0,75; \mu_5 = 1,3;$
- $q_1(0) = 8; q_2(0) = 1; q_3(0) = 15; q_4(0) = 3;$
- $q_5(0) = 9;$
- $T = 40.$



.5.

. 5,

0 30.

$t_{CTPS}=26,6.$

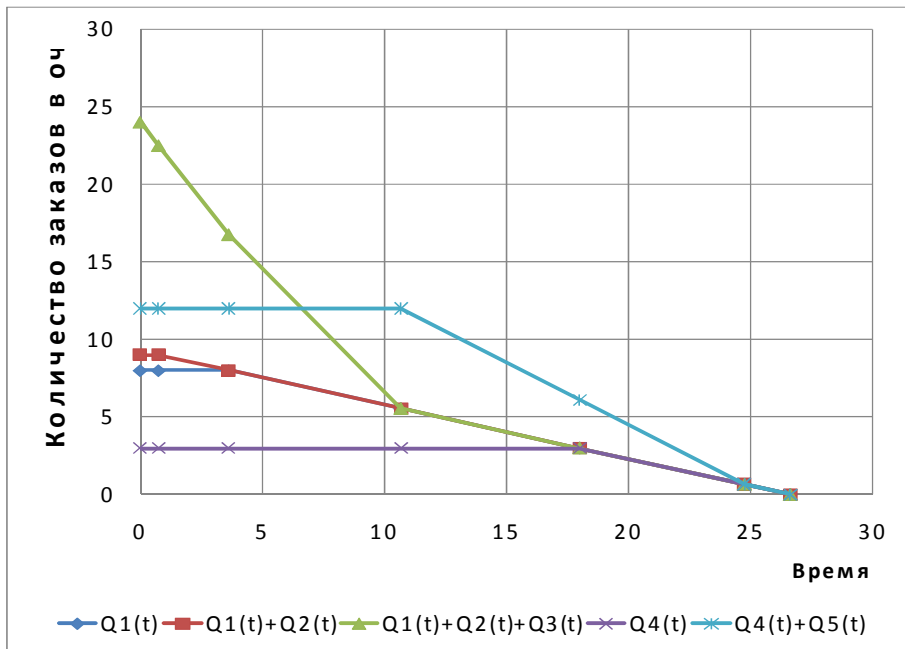
. 11,

SLA

($CTPS=27,3$).

$t_{CTPS1} = t_{CTPS2} = 26,6$

. 6.



. 6.

$$t_{CTPS1} = t_{CTPS2} = 26,6$$

. 7.

26.6.

$$t_{CTPS1}$$

$$t = 21 \quad t = 26,6$$

t_{CTPS2} .

2.

$$t = 0 \quad t = 21,$$

$$t_{CTPS1}$$

100%.



.7.

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JobShopSimulator.

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WEISS.

100

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. 3.

95%

3%

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10%

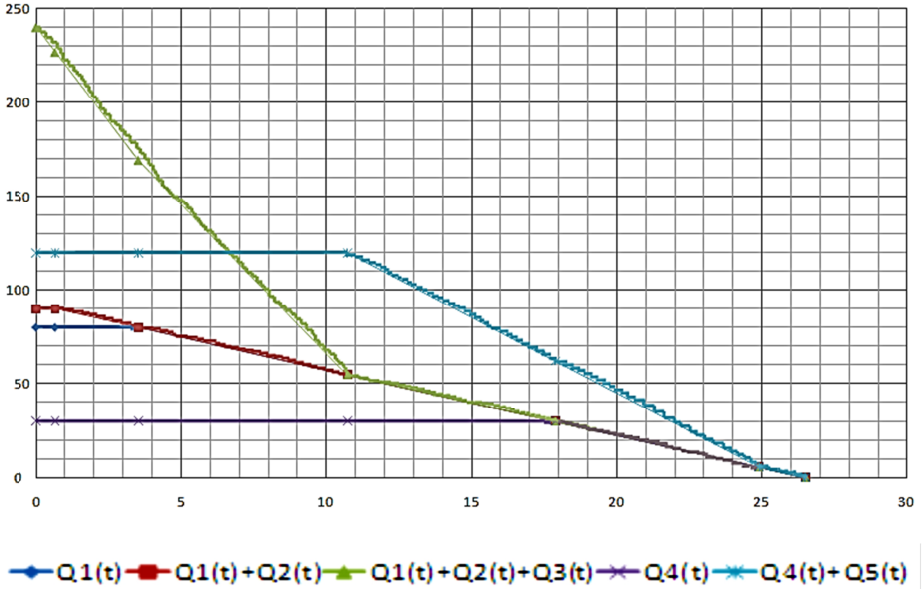
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(. 6).

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26,7,
3,3

0%.



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NGOSS «

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Order Management OSS through Java®.

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