Start of System

Client A Server SC=None (Csc=0) last\_sync=0 Ssc=None obj=None Obj=None

Client B (Csc=0) last\_sync=0 obj=None

No sync count. No objects.

Comment

Local Change Server Client A SC=None (Csc=0) last\_sync=0 Ssc=None sid=0,ls=0,lc=1 Obj=None

Client B (Csc=0) last sync=0 obj=None

Client A creates an object locally.

Csc would appear as zero.

Csc would appear unchanged.

Start Upload Phase

Client A Server SC=1,isC=0 last\_sync=0 last\_sync=0 sid=0,ls=0 sid=0,ls=0,lc=1 Obj=None

Client B (Csc=0) last sync=0 obj=None

Session started. Ssc is issued outside of the data transaction.

Csc would appear unchanged.

Server Client A Csc=1 last\_sync=1
sid=1,ls=1,lc=0 id=1,lS=1 Ssc=None id=1,lS=1

Client B (Csc=1) last\_sync=0 obj=None

New object will be committed due to provided sid=0. Session is marked committed. Whole objects are returned where lS > last\_sync. Csc would appear changed.

Start Download Phase

Client A SC=1,isC=1 last\_sync=1 last\_sync=1 sid=1,ls=1,lc=0 Ssc=None id=1,lS=1 Client B

(Csc=1) last\_sync=0 obj=None

Client A download phase. Client sends last\_sync.

Csc would appear unchanged.

Server Client A SC=1,isC=1 Csc=1 last\_sync=1 Ssc=None Obi=None sid=1,ls=1,lc=0 id=1, lS=1

Client B (Csc=1) last\_sync=0 obj=None

Server returns objects where lS > last\_sync.

Csc would appear unchanged.

Start Download Phase

Server Client A SC=1,isC=1 (Csc=1) last\_sync=1 Ssc=None sid=1,ls=1,lc=0 id=1, \S=1 Client B last\_sync=0 last\_sync=0 obj=None

Client B download phase. Client sends last\_sync.

Csc would appear unchanged.

Server Client A (Csc=1) SC=1,isC=1 last svnc=1 sid=1,ls=1,lc=0 Ssc=None id=1,lS=1 Client B

Server returns objects where lS > last\_sync.

Csc=1 last sync=1 id=1,lS=1 sid=1,ls=1,lc=0 Csc would appear unchanged.

Local Change

Client A Server (Csc=1) SC=1.isC=1 last\_sync=1 sid=1,ls=1,lc=1 Ssc=None id=1,lS=1 Client B (Csc=1) last\_sync=1

sid=1.ls=1.lc=0

sid=1,ls=1,lc=0

Client A changes object locally.

Csc would appear unchanged.

Start Upload Phase

Client A Server last\_sync=1 last\_sync=1 SC=2,isC=0 Ssc=2 sid=1,ls=1 sid=1,ls=1,lc=1 id=1,lS=1 Client B (Csc=1) last\_sync=1

Session started. Ssc is issued outside of the data transaction. Csc would appear unchanged.

Server	>>>	Client A
SC=2,isC=1	Csc=2	last_sync=2
SC=2,isC=1 Ssc=None	id=1,lS=2	sid=1,ls=2,lc=0
id=1,lS=2		

- **Client B**(Csc=2) last\_sync=1
sid=1,ls=1,lc=0

Object committed due to provided ls >= lS.
Session is marked committed.
Whole objects are returned where lS > last\_sync.
Csc would appear changed.

Local Change

Server	-	Client A
Server SC=2,isC=1 Ssc=None	(Csc=2)	last_sync=2
Ssc=None		sid=1,ls=2,lc=0
id=1,lS=2		
		Cliant D

- Client B
(Csc=2) last\_sync=1
sid=1,ls=1,lc=1

Local change made to old version of object.

Csc would appear unchanged.

Start Upload Phase

Server	-	Client A
SC=3,isC=0	(Csc=2)	last_sync=2
Ssc=3		sid=1,ls=2,lc=0
id=1.1S=2		

<< Client B
last\_sync=1 last\_sync=1
sid=1,ls=1 sid=1,ls=1,lc=1</pre>

Session started.
Ssc is issued outside of
the data transaction.

Csc would appear unchanged.

Object is not committed due to NOT ls >= lS. Session is marked committed. Whole objects are returned where lS > last\_sync. Possible notice to user: Csc would appear changed.

Local change made to current

Sync returned new versions some local changes disgarded. Sync before making changes to avoid this.

Local Change

Server	-	Client A
SC=3,isC=1	(Csc=3)	last_sync=2
Ssc=None		sid=1,ls=2,lc=0
id=1,lS=2		
	-	Client B
	(Csc=3)	last sync=3

version of object.

Csc would appear unchanged.

Start Upload Phase

server	-	CLIENT A
SC=4,isC=0 Ssc=4 id=1,lS=2	(Csc=3)	last_sync=2
Ssc=4		sid=1,ls=2,lc=0
id=1,lS=2		
	<<<	Client B
	last_sync=3	last_sync=3
	sid=1.1s=2	sid=1 ls=2 lc=1

Session started.
Ssc is issued outside of
the data transaction.

Csc would appear unchanged.

Object is committed due to provided ls >= lS.
Session is marked committed.
Whole objects are returned where lS > last\_sync.
Csc would appear changed.

Start Download Phase

Server	<<<	Client A
SC=4,isC=1	last_sync=2	last_sync=2
Ssc=None		sid=1,ls=2,lc=0
id=1,lS=4		
	-	Client B
	(Csc=4)	last_sync=4
		sid=1,ls=4,lc=0

Client A download phase.
Client sends last\_sync.

Csc would appear unchanged.

Server returns objects where lS > last\_sync. Csc would appear unchanged.

			Cor	ncurrency 1			
Start of Sys	stem		Comment				
Server	-	Client A	No sync count.				
SC=None	(Csc=0)	last_sync=0	No objects.				
Ssc=None		obj=None					
Obj=None							
	-	Client B					
	(Csc=0)	last_sync=0					
		obj=None	Csc would appear as zero.				
Local Change				Local Change			1
Server	-	Client A	Client A creates an object	Server	-	Client A	Client B creates an object
SC=None	(Csc=0)	last_sync=0	locally.	SC=None	(Csc=0)	last_sync=0	locally.
Ssc=None		sid=0,ls=0,lc=1		Ssc=None		sid=0,ls=0,lc=1	
Obj=None				Obj=None			
	-	Client B			-	Client B	
	(Csc=0)	last_sync=0			(Csc=0)	last_sync=0	
		obj=None	Csc would appear unchanged.			sid=0,ls=0,lc=1	Csc would appear unchanged.
					_,		
Start Upload		Cliont A	Fossion started	Start Upload	Phase	Cliont A	Fossion started
Server SC=1.isC=0	0	Client A	Session started.	Server	- (Csc=0)	Client A	Session started.
		last_sync=0	Ssc is issued outside of	SC=1,isC=0	(CSC=0)	last_sync=0	Ssc is issued outside of
Ssc=1	S10=0, LS=0	sid=0,ls=0,lc=1	the data transaction.	SC=2,isC=0		sid=0,ls=0,lc=1	the data transaction.
Obj=None				Ssc=2			
		61 1 B		Obj=None		61 l D	
		Client B			<<<	Client B	
	(Csc=0)	last_sync=0				last_sync=0	
		sid=0,ls=0,lc=1	Csc would appear unchanged.		\$10=0, LS=0	sid=0,ls=0,lc=1	Csc would appear unchanged.
Server	>>>	Client A	New object will be committed	Server		Client A	New object will be committed
	Csc=1		1 1 -				-
SC=1,isC=1		last_sync=1	due to provided sid=0.	SC=1,isC=1	(Csc=2)	last_sync=1	due to provided sid=0.
SC=2,isC=0	10=1, (5=1	sid=1,ls=1,lc=0	Session is marked committed.	SC=2,isC=1		sid=1,ls=1,lc=0	Session is marked committed.
Ssc=None		Cliant D	Whole objects are returned	Ssc=None	>>>	Cliant B	Whole objects are returned
id=1,lS=1	(Coo. 1)	Client B	where lS > last_sync.	id=1,lS=1		Client B	where lS > last_sync.
	(Csc=1)	last_sync=0		id=2,lS=2	Csc=2 id=1,lS=1	last_sync=2	
		sid=0,ls=0,lc=1	Can usual di annonni abangad			sid=1,ls=1,lc=0 sid=2,ls=2,lc=0	Cas yould annean shaned
			Csc would appear changed.		14-2, (3-2	S1U-2, (S-2, (C-0	Csc would appear changed.
Local Change				Local Change			
Server	-	Client A	Client A changes an object	Server	-	Client A	Client B changes the same
SC=1,isC=1	(Csc=2)	last sync=1	locally.	SC=1,isC=1	(Csc=2)	last sync=1	object locally.
SC=2,isC=1	,	sid=1,ls=1,lc=1		SC=2,isC=1	,	sid=1,ls=1,lc=1	
Ssc=None		320 1/03 1/00 1		Ssc=None		510 1/15 1/10 1	
id=1,lS=1	-	Client B		id=1,lS=1	-	Client B	
id=2,lS=2	(Csc=2)	last sync=2		id=2,1S=2	(Csc=2)	last sync=2	
	,	sid=1,ls=1,lc=0			,	sid=1,ls=1,lc=1	
		sid=2,ls=2,lc=0	Csc would appear unchanged.			sid=2,ls=2,lc=0	Csc would appear unchanged.
Start Upload	l Phase			Start Upload	Phase		
Server	<<<	Client A	Session started.	Server	-	Client A	Session started.
SC=3,isC=0	last_sync=1	last_sync=1	Ssc is issued outside of	SC=3,isC=0	(Csc=2)	last_sync=1	Ssc is issued outside of
Ssc=3	sid=1,ls=1	sid=1,ls=1,lc=1	the data transaction.	SC=4,isC=0		sid=1,ls=1,lc=1	the data transaction.
id=1,lS=1			Trailing committed SC rows	Ssc=4			
id=2,lS=2			are deleted.	id=1,lS=1			
1	-	Client B		id=2,lS=2	<<<	Client B	
	(Csc=2)	last_sync=2			last_sync=2	last_sync=2	
		sid=1,ls=1,lc=1				sid=1,ls=1,lc=1	
		sid=2,ls=2,lc=0	Csc would appear unchanged.			sid=2,ls=2,lc=0	Csc would appear unchanged.
Server	>>>	Client A	Object will be committed	Server	-	Client A	Object is not committed due
SC=3,isC=1	Csc=3	last_sync=3	due to ls >= lS.	SC=3,isC=1	(Csc=4)	last_sync=3	to NOT ls >= lS.
SC=4,isC=0	id=1,lS=3	sid=1,ls=3,lc=0	Session is marked committed.	SC=4,isC=1		sid=1,ls=3,lc=0	Session is marked committed.
Ssc=None	id=2,ls=2	sid=2,ls=2,lc=0	Whole objects are returned	Ssc=None		sid=2,ls=2,lc=0	Whole objects are returned
id=1,lS=3			where lS > last_sync.	id=1,lS=3			where lS > last_sync.
id=2,lS=2	-	Client B		id=2,lS=2	>>>	Client B	Possible notice to user.
	(Csc=3)	last_sync=2			Csc=4	last_sync=4	
1		sid=1,ls=1,lc=1			id=1,lS=3	sid=1,ls=3,lc=0	
		sid=2,ls=2,lc=0	Csc would appear changed.			sid=2,ls=2,lc=0	Csc would appear changed.
		· · · · · · · · · · · · · · · · · · ·					, <u> </u>

Server	-	Client A	Objec
SC=3,isC=1	(Csc=4)	last sync=3	tols
SC=4,isC=1		sid=1,ls=3,lc=0	Sessi
Ssc=None		sid=2,ls=2,lc=0	Whole
id=1,lS=4			where
id=2,lS=2	>>>	Client B	NOT F
	Csc=4	last_sync=4	BUT W
	id=1,lS=4	sid=1,ls=4,lc=0	
		sid=2,ls=2,lc=0	Csc w

ect may be committed due
ls >= lS.
sion is marked committed.
le objects are returned
ure lS > last\_sync.
FIRST-IN-FIRST-SERVED.
WOULD RESOLVE EVENTUALLY. would appear changed.

			Con	currency 2			
Start of Sys	stem		Comment				
Server SC=None Ssc=None	(Csc=0)	Client A last_sync=0	No sync count. No objects.				
Obj=None	-	obj=None Client B					
	(Csc=0)	last_sync=0 obj=None	Csc would appear as zero.				
Local Change				Local Change			
Server SC=None Ssc=None Obj=None	(Csc=0)	<pre>Client A last_sync=0 sid=0,ls=0,lc=1</pre>	Client A creates an object locally.	Server SC=None Ssc=None Obj=None	(Csc=0)	<pre>Client A last_sync=0 sid=0,ls=0,lc=1</pre>	Client B creates an object locally.
	- (Csc=0)	Client B last_sync=0 obj=None	Csc would appear unchanged.	,	- (Csc=0)	<pre>Client B last_sync=0 sid=0,ls=0,lc=1</pre>	Csc would appear unchanged.
Start Upload Server	l Phase	Client A	Session started.	Start Upload Server	Phase -	Client A	Session started.
SC=1,isC=0		last sync=0	Ssc is issued outside of	SC=1,isC=0	(Csc=0)	last sync=0	Ssc is issued outside of
Ssc=1 Obj=None		sid=0,ls=0,lc=1	the data transaction.	SC=2,isC=0 Ssc=2 Obj=None		sid=0,ls=0,lc=1	the data transaction.
	-	Client B		l los, none	<<<	Client B	
	(Csc=0)	last_sync=0				last_sync=0	
		sid=0,ls=0,lc=1	Csc would appear unchanged.		sid=0,ls=0	sid=0,ls=0,lc=1	Csc would appear unchanged.
Server	>>>	Client A	New object will be committed	Server	-	Client A	New object will be committed
SC=1,isC=1	Csc=1	last_sync=1	due to provided sid=0.	SC=1,isC=1	(Csc=2)	last_sync=1	due to provided sid=0.
SC=2,isC=0 Ssc=None	id=1,lS=1	sid=1,ls=1,lc=0	Session is marked committed. Whole objects are returned	SC=2,isC=1 Ssc=None		sid=1,ls=1,lc=0	Session is marked committed. Whole objects are returned
id=1,lS=1	-	Client B	where lS > last_sync.	id=1,lS=1	>>>	Client B	where IS > last_sync.
	(Csc=1)	last_sync=0		id=2,1S=2	Csc=2	last_sync=2	
		sid=0,ls=0,lc=1				sid=1,ls=1,lc=0	
			Csc would appear changed.		1d=2, LS=2	sid=2,ls=2,lc=0	Csc would appear changed.
Local Change	•			Local Change			
Server SC=1,isC=1 SC=2,isC=1	(Csc=2)	<pre>Client A last_sync=1 sid=1,ls=1,lc=1</pre>	Client A changes an object locally.	Server SC=1,isC=1 SC=2,isC=1	(Csc=2)	<pre>Client A last_sync=1 sid=1,ls=1,lc=1</pre>	Client B changes the same object locally.
Ssc=None id=1,lS=1 id=2,lS=2	- (Csc=2)	Client B last sync=2		Ssc=None id=1,lS=1 id=2,lS=2	- (Csc=2)	Client B last sync=2	
		sid=1,ls=1,lc=0				sid=1,ls=1,lc=1	
		sid=2,ls=2,lc=0	Csc would appear unchanged.			sid=2,ls=2,lc=0	Csc would appear unchanged.
Start Upload				Start Upload	Phase		1
Server SC=3,isC=0 Ssc=3 id=1,lS=1		<pre>Client A last_sync=1 sid=1,ls=1,lc=1</pre>	Session started. Ssc is issued outside of the data transaction. Trailing committed SC rows	Server SC=3,isC=0 SC=4,isC=0 Ssc=4	(Csc=2)	<pre>Client A last_sync=1 sid=1,ls=1,lc=1</pre>	Session started. Ssc is issued outside of the data transaction.
id=2,lS=2	- (Csc=2)	Client B last_sync=2	are deleted.	id=1,lS=1 id=2,lS=2	<<< last_sync=2	Client B last_sync=2	
		sid=1,ls=1,lc=1 sid=2,ls=2,lc=0	Csc would appear unchanged.		sid=1,ls=1	<pre>sid=1,ls=1,lc=1 sid=2,ls=2,lc=0</pre>	Csc would appear unchanged.
			Long running transaction	Server	-	Client A	Object will be committed due
			and inserts running in background.	SC=3,isC=0 SC=4,isC=1	(Csc=2)	<pre>last_sync=1 sid=1,ls=1,lc=1</pre>	to ls >= lS. Session is marked committed.
				Ssc=None id=1,lS=4 id=2,lS=2	>>>	Client B	Whole objects are returned where IS > last_sync.
					Csc=2 id=1,lS=4	<pre>last_sync=2 sid=1,ls=4,lc=0 sid=2,ls=2,lc=0</pre>	Csc would appear unchanged.
Server	>>>	Client A	Object is not committed due				
SC=3,isC=1 SC=4,isC=1 Ssc=None	Csc=4 id=1,lS=4 id=2,ls=2	last_sync=4 sid=1,ls=4,lc=0 sid=2,ls=2,lc=0	to NOT ls >= lS. Session is marked committed. Whole objects are returned				
id=1,lS=4	_	Client P	where IS > last_sync.				
id=2,lS=2	(Csc=4)	Client B last_sync=2 sid=1,ls=4,lc=0 sid=2,ls=2,lc=0	Possible notice to user. Possible future local changes over write on Client B. Csc would appear changed.				
		J_u-2, LJ-2, LL-U	pose would appear changes.				1.1

Csc would appear changed.

### Start of Syste

Start of Syste	em			
Server	-	Client A		
SC=None	(Csc=0)	last_sync=0		
Ssc=None		obj=None		
Obj=None				
	-	Client B		

(Csc=0) last\_sync=0 obj=None

Comment No sync count. No objects. Csc would appear as zero.

Server Client A (Csc=1) SC=1,isC=1 last\_sync=0 Ssc=None obj=None id=1,lS=1 Client B (Csc=1) last\_sync=0 obj=None Object committed to server. (Raw data load example) (Do not perform online) (Recovery or preload example) Csc would appear as 1.

# Start Download Phase Server

Start Downtoau Filase				
	Server	<<<	Client A	
	SC=1,isC=1	last_sync=0	last_sync=0	
	Ssc=None		obj=None	
	id=1,lS=1			
		-	Client B	
		(Csc=1)	last_sync=0	
			obj=None	

Client A download phase. Client sends last\_sync. Csc would appear unchanged.

Client A Server SC=1,isC=1 Csc=1 last\_sync=1
id=1,lS=1 sid=1,ls=1,lc=0 Ssc=None id=1,lS=1 Client B (Csc=1) last\_sync=0 obj=None

Server returns objects where lS > last\_sync. Csc would appear unchanged.

# Start Download Phase Server SC=1,isC=1

50.00.		CCICIC A
SC=1,isC=1	(Csc=1)	last_sync=1
Ssc=None		sid=1,ls=1,lc=0
id=1,lS=1		
	<<<	Client B
	last_sync=0	last_sync=0
		ahi Nana

Client B download phase. Client sends last\_sync. Csc would appear unchanged.

Client A Server SC=1,isC=1 (Csc=1) last\_sync=1 Ssc=None sid=1,ls=1,lc=0 id=1,lS=1

Client B Csc=1 last\_sync=1
id=1,lS=1 sid=1,ls=1,lc=0

Client A

Server returns objects where lS > last\_sync. Csc would appear unchanged.

### Start of System

Start Or Sy	S LEIII	Comment	
Server	-	Client A	No sync count.
SC=None	(Csc=0)	last_sync=0	No objects.
Ssc=None		obj=None	
Obj=None			
	-	Client B	
	(Csc=0)	last_sync=0	
		obj=None	Csc would appear as zero.

#### Start Download Phase

Server	<<<	Client A	Client A download phase.
SC=None	last_sync=0	last_sync=0	Client sends last_sync.
Ssc=None		obj=None	
Obj=None			
	-	Client B	
	(Csc=0)	last_sync=0	
		obj=None	Csc would appear unchanged.

Server	>>>	Client A	Server returns objects where
SC=None	Csc=0	last_sync=0	lS > last_sync.
Ssc=None	Obj=None	obj=None	
Obj=None			
	-	Client B	
	(Csc=0)	last_sync=0	
I		obj=None	Csc would appear unchanged.

# LEGEND

SC	Sync Count
isC	isCommitted
Csc	Committed Sync Count*
Ssc	Session Sync Count*
id	Object ID on Server
ıs	Object Last Sync on Server
last_sync	client last sync
sid	Server Object ID
ls	Object Last Sync
lc	local changes

<sup>\*</sup>generated by queries.