

Arquitectura del Computador y Sistemas Operativos

Decimocuarta Clase



Formato EXT2 (1/11)

Superbloque

```
00000400 00 00 01 00 00 ff 03 00 26 33 00 00 a5 f5 03 00 | .....&3.....|
00000410 f5 ff 00 00 00 00 00 00 02 00 00 00 02 00 00 00 | .....|
00000420 00 80 00 00 00 80 00 00 00 20 00 00 00 00 00 00 | .....|
00000430 a4 9b e7 66 00 00 ff ff |...f....|
```

Offset	Bytes	Contenido	Decodificación	Explicación
0x0400	4	00 00 01 00	65536	Total de iNodes en el filesystem
0x0404	4	00 FF 03 00	261888	Total de bloques en el filesystem
0x0408	4	00 00 33 26	13094	Bloques sólo usables por el super-usuario
0x040C	4	A5 F5 03 00	259493	Bloques libres
0x0410	4	F5 FF 00 00	65525	iNodes libres
0x0418	4	02 00 00 00	4096	Tamaño del bloque: log2(tamaño)-10
0x041C	4	02 00 00 00	4096	Tamaño del fragmento: log2(tamaño)-10
0x0420	4	00 80 00 00	32768	Número de bloques por grupo
0x0424	4	00 80 00 00	32768	Número de fragmentos por grupo
0x0428	4	00 20 00 00	8192	Número de iNodes por grupo
0x042C	4	00 00 00 00	0	Fecha de último montaje
0x0430	4	A4 9B E7 66	15/09/24 23:44:53	Fecha de última escritura
0x0434	2	00 00	0	Montajes desde último chequeo de integridad
0x0436	2	FF FF	65536	Montajes antes de forzar chequeo de integridad

Formato EXT2 (2/11)

Superbloque

```

00000430          53 ef 01 00 01 00 00 00 |          S.....|
00000440    a4 9b e7 66 00 00 00 00    00 00 00 00 01 00 00 00 |...f.....|
00000450    00 00 00 00 0b 00 00 00    80 0000 00          |.....|
  
```

Offset	Bytes	Contenido	Decodificación	Explicación
0x0438	2	53 EF	61267	Firma del EXT2
0x043A	2	01 00	1	Estado del FS (1=Ok, 2=Con errores)
0x043C	2	01 00	1	Política de errores (1=Ignorar, 2=RO, 3=K Panic)
0x043E	2	00 00	0	Sub-versión del filesystem (minor version)
0x0440	4	A4 9B E7 66	15/09/24 23:44:53	Fecha de último chequeo de integridad
0x0444	4	00 00 00 00		Tiempo entre forzado de chequeos de integridad
0x0448	4	00 00 00 00	0	Id del SO donde se formateó (0=Linux)
0x044C	4	01 00 00 00	1	Versión del filesystem (mayor version)
0x0450	2	00 00	0	Id de usuario de bloques reservados (0=root)
0x0452	2	00 00	0	Id de grupo usuario de bloques reserv. (0=root)
0x0454	4	0B 00 00 00	11	Primer iNode no reservado
0x0458	2	80 00	128	Tamaño en bytes de un iNode
0x045C	4	38 00 00 00	0x0038	Features opcionales: 0x0008: Extended attributes 0x0010: Soporta resize 0x0020: Hash index de directorios

SO



Formato EXT2 (3/11)

Superbloque

```
00000450                                     38 00 00 00 | 8...|
00000460 02 00 00 00 03 00 00 00 c3 de 1f 7f ed ca 4e 4c | .....NL|
00000470 90 8a 21 ea 24 11 98 e5 50 52 55 45 42 41 00 00 | ...!.$...PRUEBA..|
00000480 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | .....|
*
000004c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | .....|
```

Offset	Bytes	Contenido	Decodificación	Explicación
0x045C	4	38 00 00 00	0x0038	Features opcionales: 0x0008: Extended attributes 0x0010: Soporta resize 0x0020: Hash index de directorios
0x0460	4	02 00 00 00	0x0002	Features necesarios para RW: 0x0002: Directorios con type-id
0x0464	4	03 00 00 00	0x0003	Features necesarios para RO: 0x0001: Superblocks + Group desc distribuidos 0x0002: 64 bit file size
0x0468	16	C3 DE 1F 7F ED CA 4E 4C 90 8A 21 EA 24 11 98 E5	Usar blkid	Identificador del filesystem
0x0478	16	50 52 55 45 42 41 00 00 00 00 00 00 00 00 00 00	PRUEBA	Etiqueta del filesystem
0x0488	64	00 00 ... 00 00		Último path de montaje del filesystem,
0x04C8	4	00 00 00 00	0	Algoritmos de compresión posibles



Formato EXT2 (4/11)

Superbloque

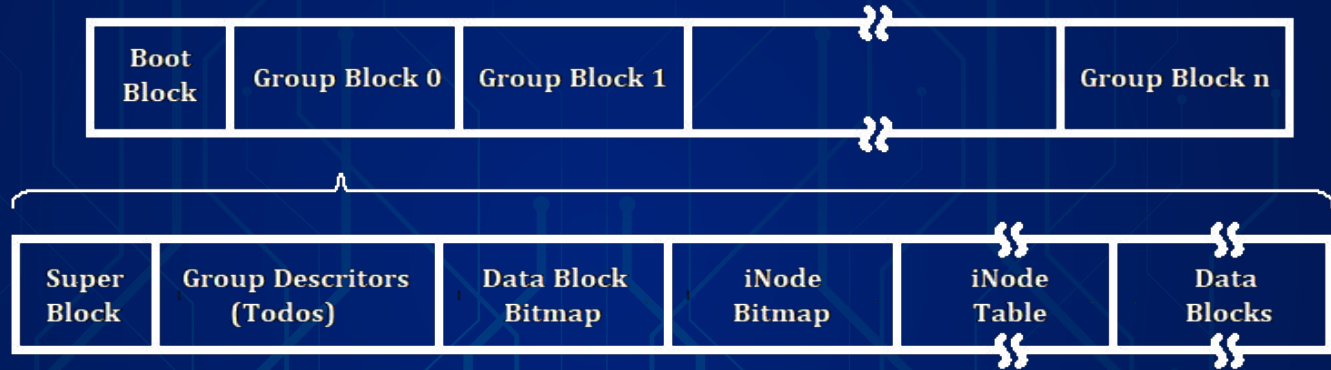
```
000004c0                                00 00 3f 00 | ..?.|
000004d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | .....|
000004e0 00 00 00 00 00 00 00 00 00 00 00 c0 b4 e8 6f | .....o|
000004f0 52 95 47 53 b0 45 43 92 5d 0f fd 9f 01 00 00 00 |R.GS.EC.].....|
00000500 0c 00 00 00 00 00 00 00 c2 3d eb 66 00 00 00 00 |.....=.f....|
```

Offset	Bytes	Contenido	Decodificación	Explicación
0x04CC	1	00	0	Archivos: BLoques a pre-alocar
0x04CD	1	00	0	Directorios: BLoques a pre-alocar
0x04CE	2	3F 00	63	Bloques Group Descriptor Table (resizing)
0x04D0	24	00 00 ... 00 00		Reservado para soporte de Journaling
0x04E8	4	00 00 00 00	0	Cabeza de orphan iNode list
0x04EC	16	C0 B4 E8 6F 52 95 47 53 b0 45 43 92 5d 0f fd 9f 01		Semilla para hashing de directorios
0x04FC	1	01	1 (half_md4)	Versión del algoritmo de hashing
0x0500	4	0c 00 00 00	12 (ACLs+ XATTR)	Opciones de montaje default
0x0504	4	03 00 00 00	3	Primer metabloque

El formato EXT2 (5/11)

Estructura General

Recordemos la estructura general del formato EXT:



El lugar disponible se divide en “*grupos*”, se trata de mantener los archivos y directorios todos dentro del mismo grupo, dado que son “*cercanos*” y se acelera el acceso.

Cada grupo, aparte del descriptor de todos los grupos que se mantiene copiado n veces por seguridad, tiene bitmaps para los bloques de iNodes y Datos

Formato EXT2 (6/11)

Ubicación de las estructuras del primer grupo

SO

En base a los datos del superbloque podemos determinar la cantidad de grupos y la posición de cada estructura en el grupo:

- Total de bloques: 261888, Bloques por grupo: 32768
Número de grupos de bloques:
 $261888 \text{ bq} / 32768 \text{ bq/grupo} = 8 \text{ grupos}$
- Total de iNodes 65536, iNodes por grupo: 8192
Número de grupos de bloques:
 $65536 \text{ in} / 8192 \text{ in/grupo} = 8 \text{ grupos}$
- Bloques por grupo: 32768, Tamaño del bloque: 4096 bytes
Tamaño del grupo:
 $32768 \times 4096 \text{ bytes} = 13 \text{ Mb (32 Kbq)}$
- Bloques por grupo: 32768, Bytes por bloque: 0.125
Tamaño del bitmap de bloques:
 $32768 \text{ bq} \times 0.125 \text{ bytes/bq} = 4096 \text{ bytes (1 bq)}$
- iNodes por grupo: 8192, Bytes por iNode: 0.125
Tamaño del bitmap de iNodes:
 $8192 \text{ bq} \times 0.125 \text{ bytes/bq} = 1024 \text{ bytes (0.25 bq)}$
- iNodes por grupo: 8192, Bytes por iNode: 128
Tamaño arreglo de iNodes:
 $8192 \text{ iNodes} \times 128 \text{ bytes/iNode} = 1 \text{ Mb (256 bq)}$

Bloque	Inicio	Fin	Función
0	000 0000	000 03FF	No usado
	000 0400	000 07FF	Superblock
	000 0800	000 0FFF	No usado
1	000 1000	000 10FF	Group Descriptor Table
	000 1100	000 1FFF	No usado
2-64	000 2000	004 0FFF	GDT - Reservado
65	004 1000	004 1FFF	Bitmap de bloques
66	004 2000	004 23FF	Bitmap de iNodes
	004 2400	004 2FFF	No usado
67-322	004 3000	014 2FFF	Tabla de iNodes
323 - 32367	014 3000	7FF FFFF	Bloques de datos



Format EXT2 (7/11)

Tabla Descriptora de Grupos (Group Descriptor Table)

00001000	41 00 00 00 42 00 00 00	43 00 00 00 b7 7e f5 1f	A...B...C....~..
00001010	02 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
00001020	41 80 00 00 42 80 00 00	43 80 00 00 bd 7e 00 20	A...B...C....~.
00001030	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
00001040	00 00 01 00 01 00 01 00	02 00 01 00 fe 7e 00 20~.
00001050	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
00001060	41 80 01 00 42 80 01 00	43 80 01 00 bd 7e 00 20	A...B...C....~.
00001070	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
00001080	00 00 02 00 01 00 02 00	02 00 02 00 fe 7e 00 20~.
00001090	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
000010a0	41 80 02 00 42 80 02 00	43 80 02 00 bd 7e 00 20	A...B...C....~.
000010b0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
000010c0	00 00 03 00 01 00 03 00	02 00 03 00 fe 7e 00 20~.
000010d0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
000010e0	41 80 03 00 42 80 03 00	43 80 03 00 bd 7d 00 20	A...B...C....}.
000010f0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00

Offset	Bytes	Contenido	Decodificación	Explicación
0	4	41 00 00 00	65	Bloque del bitmap de uso de bloques
4	4	42 00 00 00	66	Bloque del bitmap de uso de iNodes
8	4	43 00 00 00	67	Bloque de comienzo de la tabla de iNodes
12	2	B7 7E	32439	Bloques libres en el grupo
14	2	F5 1F	8181	iNodes libres en el grupo
16	2	02 00	2	Número de directorios en el grupo

- Hay 6 bloques usados.
- Quedan $8192 - 11 = 8181$ iNodes libres → Comparar con GDT



Formato EXT2 (9/11)

Análisis del Bitmap de iNodes

Bitmap de iNodes:

```
00042000  ff 07 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | .....|
00042010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | .....|
```

Hay 1 byte + 3 bits marcados en 1, que representan 11 iNodes usados.

Conclusiones:

- Hay 11 iNodes usados.
- Quedan $32368 - 329 = 32439$ bloques libres → Comparar con GDT

El superbloque indicaba que había 11 iNodes reservados. La documentación indica

iNode	Función	iNode	Función
1	Bad block iNode	6	Undelete iNode
2	Root iNode	7	Reservado para resizing
3	User Quota	8	Reservado Journal
4	Group Quota	9	Reservado snapshots en Next3 FS
5	Boot Loader iNode	10	Reservador replication



Formato EXT2 (10/11)

Análisis de iNodes usados

iNode 2 (Root Directory):

```
00043080  ed 41 00 00 00 10 00 00  c2 3d eb 66 c2 3d eb 66
00043090  c2 3d eb 66 00 00 00 00  00 00 03 00 08 00 00 00
000430a0  00 00 00 00 00 00 00 00  43 01 00 00 00 00 00 00
000430b0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
000430c0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
000430d0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
000430e0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
000430f0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
```

Campo	Valor	Explicación
i_mode	0b 0100 0001 1110 1101	Directory + User + Group +Others
i_size	00 00 10 00	Tamaño en bytes
i_atime	66 EB 3D C2	Fecha de último acceso
i_ctime	66 EB 3D C2	Fecha de creación
i_mtime	66 EB 3D C2	Fecha de última modificación
i_block[15]	00 00 01 43 00 ...00	Primer bloque de datos → 0x0143

```
struct ext2_inode {
00  __le16 i_mode;      /* File mode */
02  __le16 i_uid;      /* Low 16 bits of Owner Uid */
04  __le32 i_size;     /* Size in bytes */
08  __le32 i_atime;    /* Access time */
0c  __le32 i_ctime;    /* Creation time */
10  __le32 i_mtime;    /* Modification time */
14  __le32 i_dtime;    /* Deletion Time */
18  __le16 i_gid;      /* Low 16 bits of Group Id */
1a  __le16 i_links_count; /* Links count */
1c  __le32 i_blocks;   /* Blocks count */
20  __le32 i_flags;    /* File flags */
    union {
        struct {
24      __le32 li_reserved1;
        } linux1;
        struct {
24      __le32 hi_translator;
        } hurd1;
        struct {
24      __le32 mi_reserved1;
        } masix1;
    } osd1; /* OS dependent 1 */
28  __le32 i_block[EXT2_N_BLOCKS]; /* Pointers to blocks */
2c  __le32 i_generation; /* File version (for NFS) */
30  __le32 i_file_acl; /* File ACL */
34  __le32 i_dir_acl; /* Directory ACL */
38  __le32 i_faddr; /* Fragment address */
    union {
        struct {
3c      __u8 li_frag; /* Fragment number */
3d      __u8 li_fsize; /* Fragment size */
3e      __u16 li_pad1;
40      __le16 li_uid_high; /* these 2 fields */
42      __le16 li_gid_high; /* were reserved2[0] */
44      __u32 li_reserved2;
        } linux2;
        struct {
3c      __u8 hi_frag; /* Fragment number */
3d      __u8 hi_fsize; /* Fragment size */
3e      __le16 hi_mode_high;
40      __le16 hi_uid_high;
42      __le16 hi_gid_high;
44      __le32 hi_author;
        } hurd2;
        struct {
3c      __u8 mi_frag; /* Fragment number */
3d      __u8 mi_fsize; /* Fragment size */
3e      __u16 mi_pad1;
40      __u32 mi_reserved2[2];
        } masix2;
    } osd2; /* OS dependent 2 */
};
```



Formato EXT2 (11/11)

Análisis de un directorio (Directorio Raiz)

Datos del bloque 0x143:

```
00143000 02 00 00 00 0c 00 01 02 2e 00 00 00 02 00 00 00 |.....|
00143010 0c 00 02 02 2e 2e 00 00 0b 00 00 00 e8 0f 0a 02 |.....|
00143020 6c 6f 73 74 2b 66 6f 75 6e 64 00 00 00 00 00 00 |lost+found.....|
00143030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
*
```

```
struct ext2_dir_entry_2 {
    __le32      inode;                /* Inode number */
    __le16      rec_len;              /* Directory entry length */
    __u8        name_len;             /* Name length */
    __u8        file_type;
    char        name[EXT2_NAME_LEN]; /* File name */
};
```

Entrada	Datos	Nombre	iNode
1	02 00 00 00 0C 00 01 02 2E 00 00 00	.	2
2	02 00 00 00 0C 00 02 02 2E 2E 00 00	..	2
3	0B 00 00 00 E8 0F 0A 02 6C 6F 73 74 2B 66 6F 75 6E 64 00 ... 00	lost+found	11



Ejercicio

Dados los 11 iNodes usados, encontrar en qué se usaron los 6 bloques usados del FS:

00043000	00 00 00 00 00 00 00 00	c2 3d eb 66 c2 3d eb 66=.f.=.f	1: Bad Block
00043010	c2 3d eb 66 00 00 00 00	00 00 00 00 00 00 00 00	.=.f.....	
00043020	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043030	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043040	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043050	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043060	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043070	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043080	ed 41 00 00 00 10 00 00	c2 3d eb 66 c2 3d eb 66	.A.....=.f.=.f	2: Root
00043090	c2 3d eb 66 00 00 00 00	00 00 03 00 08 00 00 00	.=.f.....	
000430a0	00 00 00 00 00 00 00 00	43 01 00 00 00 00 00 00C.....	
000430b0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000430c0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000430d0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000430e0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000430f0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043100	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	3: User quota
00043110	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043120	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043130	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043140	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043150	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043160	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043170	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043180	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	4: Group quota
00043190	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000431a0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000431b0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000431c0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000431d0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000431e0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000431f0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	

Ejercicio

SO

00043200	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	5: Bootloader
00043210	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043220	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043230	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043240	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043250	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043260	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043270	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043280	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	6: Undelete
00043290	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000432a0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000432b0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000432c0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000432d0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000432e0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000432f0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043300	80 81 00 00 00 c0 40 00	c2 3d eb 66 c2 3d eb 66@..=.f.=.f	7: Resizing
00043310	c2 3d eb 66 00 00 00 00	00 00 01 00 e0 09 00 00	.=.f.....	
00043320	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043330	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043340	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043350	00 00 00 00 00 00 00 00	00 00 00 00 48 01 00 00H...	
00043360	00 00 00 00 00 00 00 00	00 00 00 00 01 00 00 00	
00043370	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
00043380	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	8: Journal
00043390	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000433a0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000433b0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000433c0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000433d0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000433e0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	
000433f0	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	

Ejercicio

SO

```
00043400 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043410 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043420 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043430 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043440 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043450 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043460 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043470 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
```

9: Snapshots

```
00043480 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043490 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
000434a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
000434b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
000434c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
000434d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
000434e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
000434f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
```

10: Replication

```
00043500 c0 41 00 00 00 40 00 00 c2 3d eb 66 c2 3d eb 66 |.A...@...=.f=.f|
00043510 c2 3d eb 66 00 00 00 00 00 00 02 00 20 00 00 00 |.=.f..... ..|
00043520 00 00 00 00 00 00 00 00 44 01 00 00 45 01 00 00 |.....D...E...|
00043530 46 01 00 00 47 01 00 00 00 00 00 00 00 00 00 00 |F...G.....|
00043540 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043550 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043560 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043570 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00043580 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
```

11: Dir

The background of the slide is a dark blue color. It features a complex, symmetrical pattern of light blue lines that resemble a circuit board or a network diagram. These lines are composed of straight segments connected by right-angle turns, creating a dense, web-like structure. Small, glowing light blue dots are scattered throughout the pattern, particularly at the intersections and endpoints of the lines, adding a sense of digital activity or data points.

Fin
¿Preguntas?