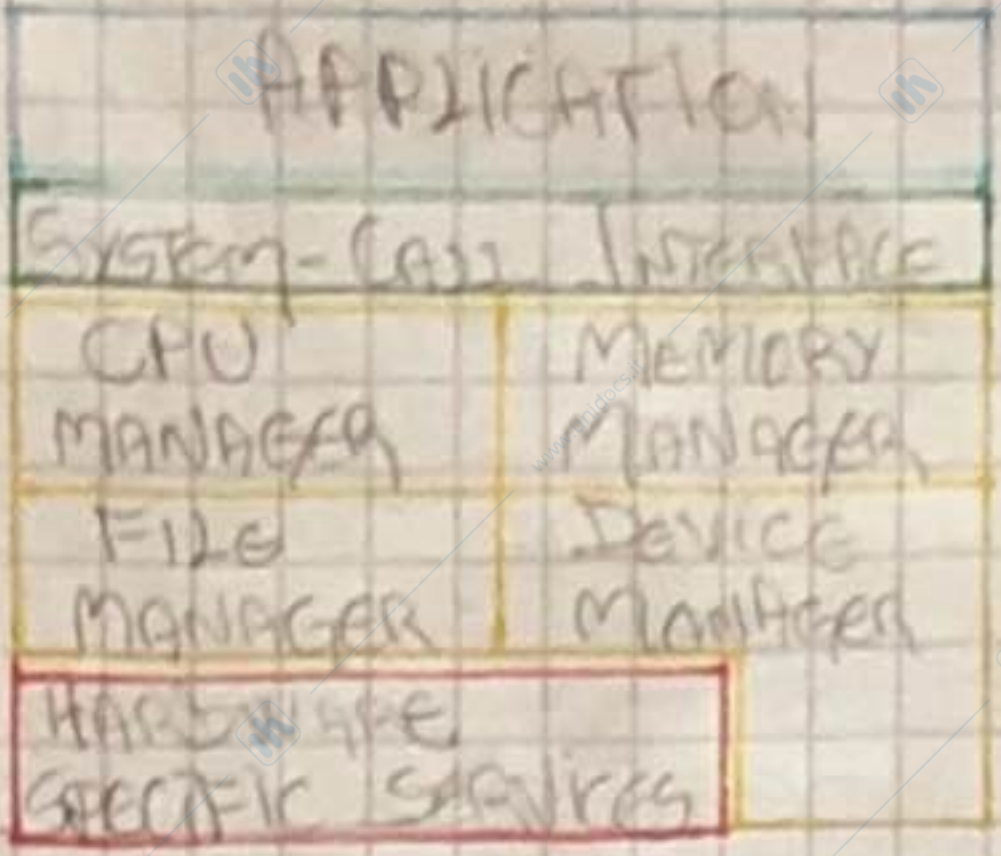
OPERATING SYSTEMS

FLAT ARCHITECTURE



MONOLITHIC KERNEL

- OS is DIVIDED INTO A NUMBER OF LAYERS, IN A TOP-DOWN HIERARCHICAL SYSTEM.
- IT USES DEDICATED VIRTUAL ADDRESS SPACE.
- ALL SERVICES ARE

STACK

AREA ALLOCATION

HEAP - USED BY LIBRARY

SCHEDULER

READY - PROCESS IS MOVED FROM RUNNING TO READY AFTER A CERTAIN TIME QUANTUM IS EXPIRED

BASIC TASK - SEQUENCE OF STATEMENTS EXECUTED ONCE FOR EACH INSTANCE. GLOBAL VARIABLES ARE USED IN DATA EXCHANGE.

CRITICAL SECTION PIECE OF CODE THAT ACCESS A SHARED EXCLUSIVE RESOURCE RACE PROBLEM, WHEN CONTENTION OF EXCLUSIVE SHARED RESOURCES OCCUR.

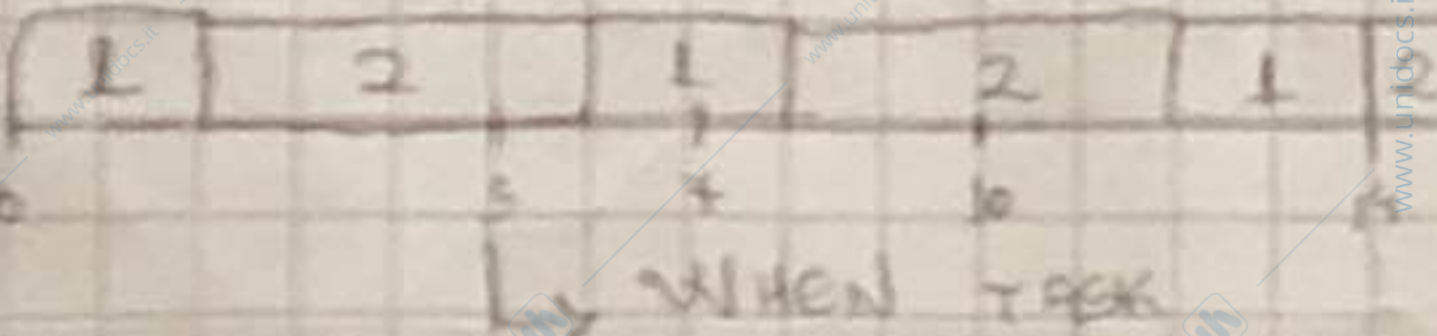
BUSY WAITING DISABLES INTERRUPTS OR SPINLOCKS

EARLIEST DEADLI

DYNAMIC PRIORI
TASK WITH THE
THE HIGHEST PRIOR
ACCORDING TO THEIR

FEASIBILITY

$$\sum_{i=1}^{m}$$



1 ARRIVES, ABSOLUTE DEADLINE OF 2 IS 7, WHEN 1 IS 10. NO PREEMPTION.

WHEN TASK

IF TASKS ARE AP
TAKEN INTO ACCOUNT,

POLLING SERVER

A SPECIAL PERIODIC SERVE APERIODIC TASK IT HAS A PERIOD T_S

EXAMPLE SERVER

	C_i	T_i
τ_1	1	4
τ_2	2	6

$C_D = 2$

$T_D = 5$

NO APERIODIC TASKS TO EXECUTE SERVER LOSES ALL OF ITS BUDGET.

FEASIBILITY

$$\frac{m}{}$$

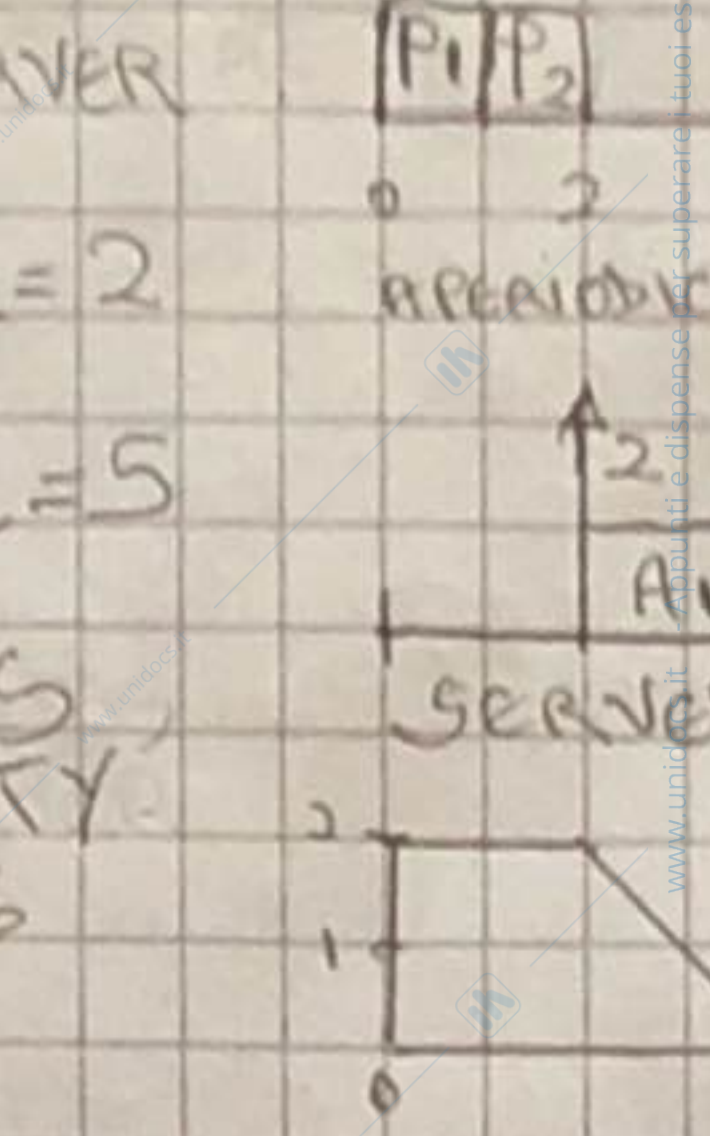
DETERMINISTIC

THE BUDGET is M
SERVER'S PERIOD.

EXAMPLE

	C_i	T_i
τ_1	1	$C_{s2}=2$
τ_2	2	6 $T_{s2}=5$

SERVER HAS
IGHER PRIORITY
SO IT PREEMPTS
OTHER TASKS.



FEASIBILITY

m

DETERMINISM

OS SHOULD GUARANT
CONSTRAINTS ARE MET
DETERMINISM: AN ALG
INPUT WILL ALWAYS PR

DIRECT MEMOR

DMA is USED BY
BETWEEN DEVICE AND M
DMA PERFORMS A DATA
BUS WITH I/O DEVICE. T
INTO TWO ADJACENT TIME

CACHE MEMORY

HIT-RATIO IMPR
ALSO AFFECTED BY PRE
INCREASING NUMBER OF
MEMORY, OVERESTIMATE

STATIC PARTITIONI

DIVIDES MAIN MEM
MEMORY REGIONS CRE
AFTER PROGRAM ARR

EQUAL-SIZE PLACE

THERE IS AN UPPER BOUND
IF A JOB OCCUPIES A SM
UNEQUAL-SIZE ASSIGNS
PARTITION THAT IT FITS.

DYNAMIC PARTIONI

MEMORY IS ALLOC
TO ACCOMODATE THE PRO
MIGHT OCCUR WHEN TOO
SATISFY A SIZE NEED
CONTIGUOUS. COMPACTI
TO PLACE AND FREE

STACK SHARING

IF AND TASKS DO

ESERCIZIO 3

TASK	TEMPO	MEMORIA
A	4	2
B	12	2

WITHOUT STACK SH

$STACK_{TOTALE} = 128 + 6$

WITH STACK SHARI

SINCE THERE'S

$STACK_{TOTALE} = 128$

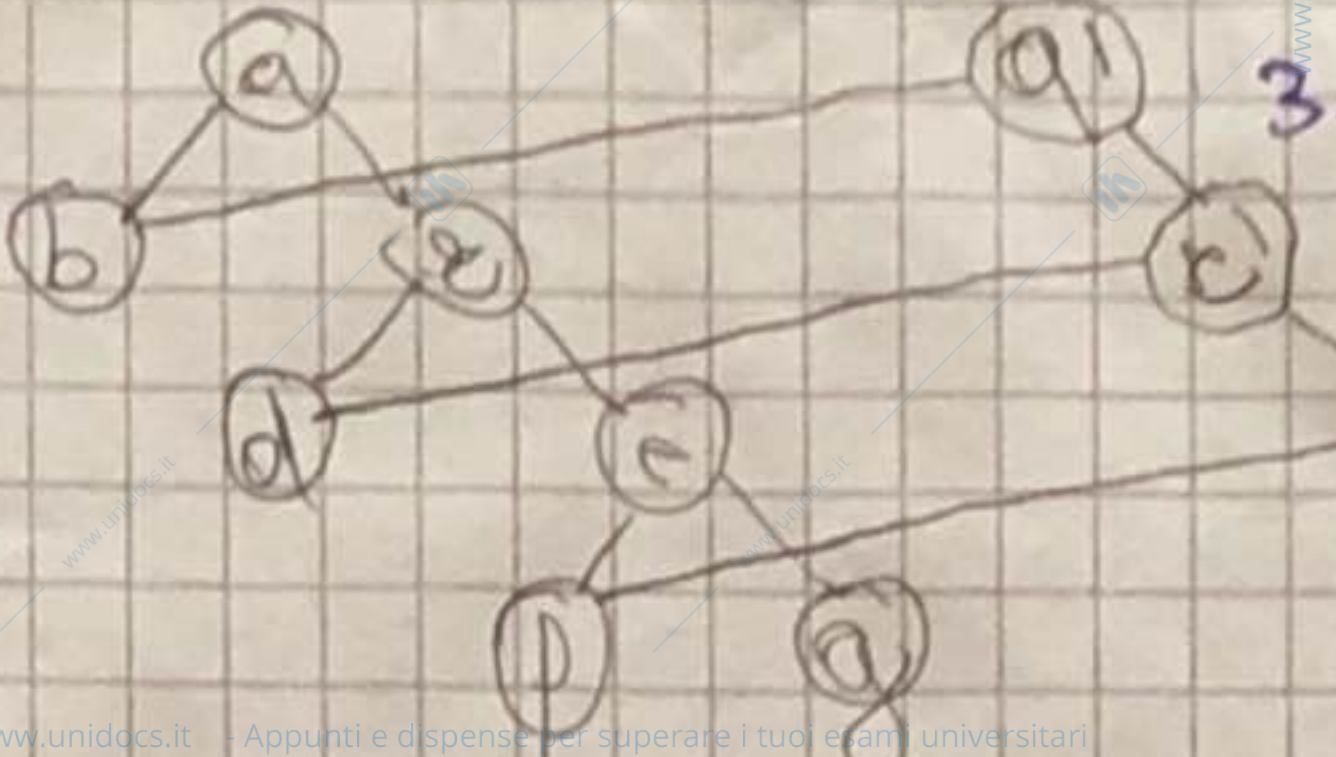
MEMORY MANAGEME

STATIC PARTITIONING

PROCESSOR MEMORY M
ACCESSES IN THE

20 FS

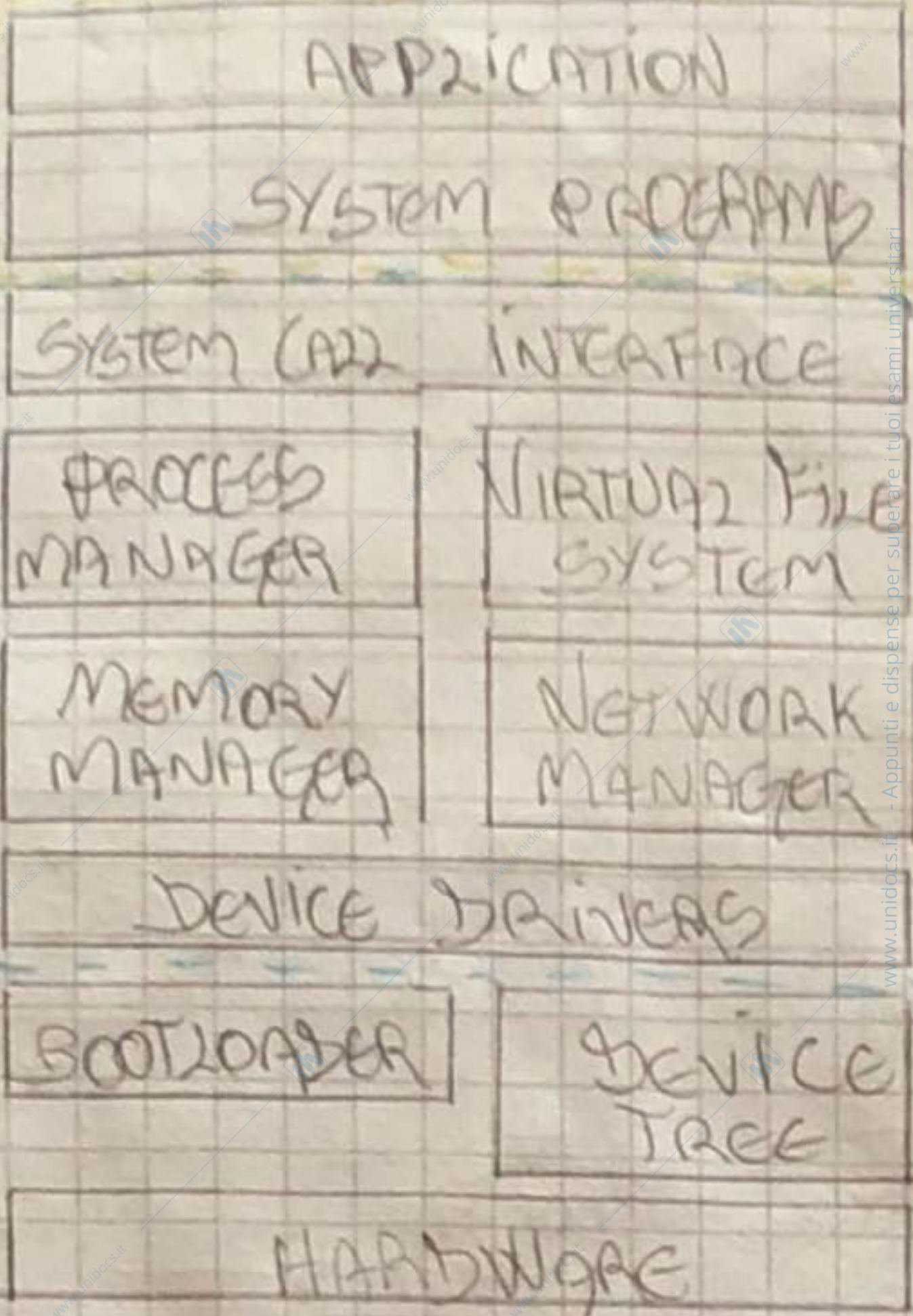
FILE SYSTEM DESIGN
OUT-OF-PLACE, THE NEW
SEPARATELY FROM THE
TO FIND A TREE'S R
STORES A LIST OF (V
VERSION IS THE CURREN
FILE SYSTEM IS NOW
LOOKING FOR THE ROOT
COMPLETED BY UPDATIN



3

AUTOSAR

ECU ABSTRACTION

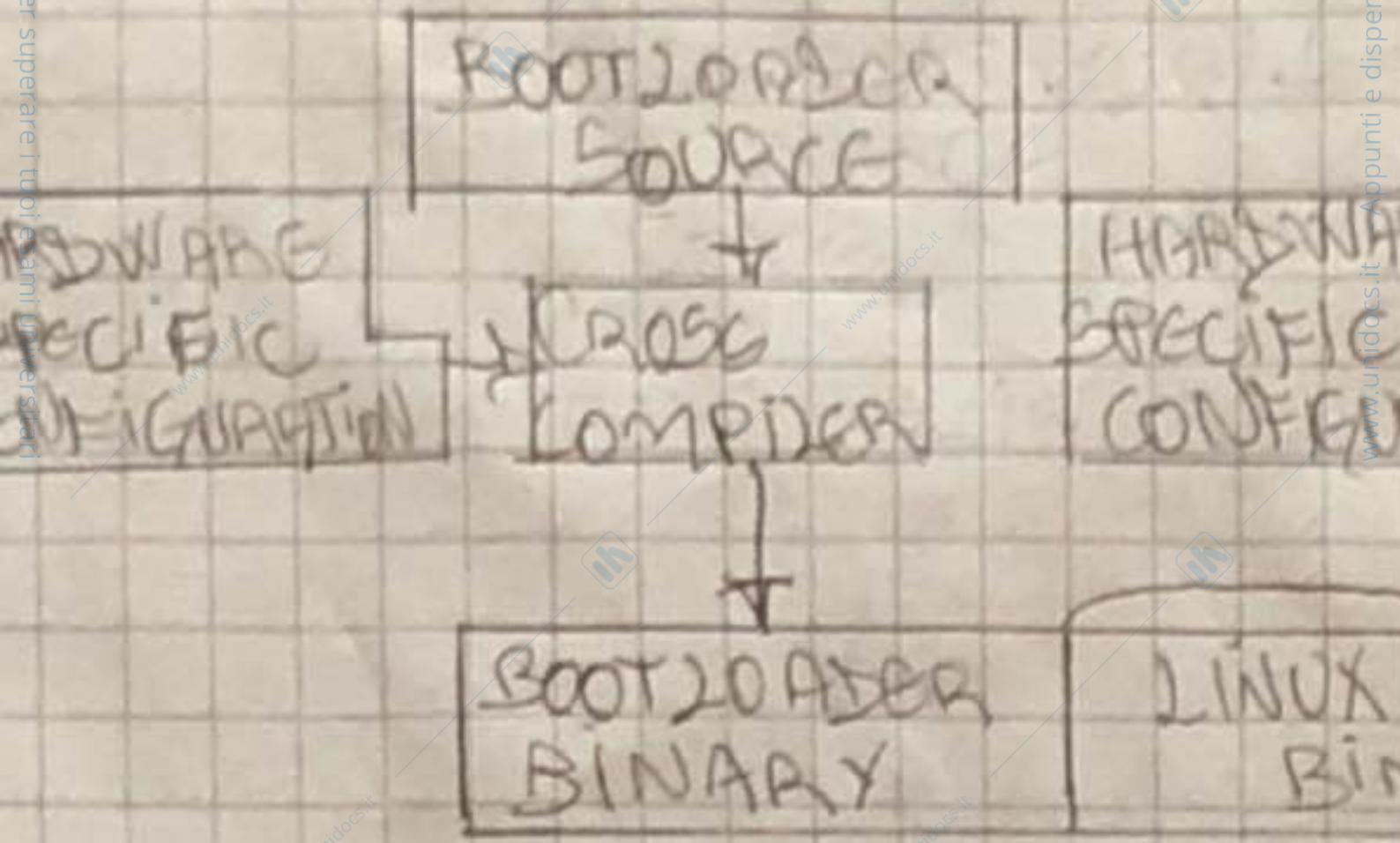


1. BEFORE POWER-UP

BUILD SYSTEMS

BUILD SYSTEMS TA
CROSS COMPILER FOR
MANAGING BOOTLOADER
PROGRAMS, BOTH CONV
AND PREPARE THE
DEVICE IMAGE.

WORKFLOW



BUILDROOT

YOCTO RECIPES

THE KIND METADATA
CONTAINING BOOTLOADER,
THE KERNEL, BUILDING
RASPBERRY PI NEEDS
RECIPES THAT PROVIDE COMP
DIFFERENT THINGS MUST

BBLAYERS.CONF THE
THE SET OF LAYERS THAT
THE LINUX DISTRIBUTION

LOCAL.CONF THE
ANC TO BE ADDED INTO THA
THAT SET OF COMPONENTS, W
DCYING PACKAGES CONTA

BITBAKE - AUTOMATI
CONTAINING RPI THE L

WHEN DEPLOYING TH
BUILT, THE PERSISTENT

BOOTSTRAP

→ PERSISTENT STORAGE

RBL - ROM Boot Loade
PROCESSOR, AND READ IN TH
SPL - SECONDARY PROGR
TARGET BOARD THAT ARE TH
PROCESSOR FOR READING U
U-BOOT - ENABLES MO
FUNCTIONALITY FOR THE TA
CONFIGURE THE PART FOR
IMAGE FROM PERSISTENT
KERNEL IMAGE - FINA
INIT, USERINIT PROCESS

→ CONNECTIVITY

AFTER BOOTING AN S
CONTINUE TO BOOT FROM UNT
U-BOOT MAY ALSO C
FILESYSTEM FROM INTERFA

U-BOOT

IT RUNS PROCESSOR IN E
T ENABLES CLOCK, PORTS U