WB Reference

This handout contains a reference of all the commands in the **WB** family of languages, along with what each language contains.

WB

Program controls a tape head over an infinite tape. The tape begins holding the input string, followed by infinitely many blank cells.

Commands:

Move *dir*: Moves the tape head in direction *dir*.

Write *s*: Writes symbol *s* under the tape head.

Go to *N*: Jumps to line *N* of the program.

If reading *s*, **go to** *N*: Jumps to line *N* of the program if reading symbol *s*.

Accept: Ends the program and accepts.

Reject: Ends the program and rejects.

WB2

Same as **WB**, but with the addition of this new command:

Move *dir* **until** {s_1, …, s_n}: Moves the tape head in direction *dir* until one of the indicated symbols is read.

WB3

Same as **WB2**, but with the addition of finitely many variables, each of which can hold a single tape symbol. All variables initially hold the blank symbol.

There are three new commands:

Load *s* **into** *v*: Stores the tape symbol *s* into *v*.

Load current into *v*: Stores the tape symbol under the tape head into *v*.

If $v_1 = v_2$, **go to** *L*: Jumps to line *L* if variables v_1 and v_2 have the same value.

WB4

Same as **WB3**, but with a multitrack tape instead of a single-track tape. Each command that moves the tape head or reads a tape symbol can be extended to say which track is being referenced.

WB5

Same as **WB4**, but with the addition of finitely many stacks. Each stack can store an unbounded number of tape symbols.

These commands can be used to control the stacks:

> **Push *s* onto stack *v***: Pushes symbol *s* onto stack *v*.
>
> **If stack *v* is empty, go to *L***: Jumps to line *L* if stack *v* is empty.
>
> **Pop stack *v* into *w***: If stack *v* is nonempty, pops its top symbol and stores it in variable *w*.

WB6

Same as **WB5**, but with the addition of finitely many tapes. Each tape has its own tape head that can move independently of the other tape heads. Tape 1 begins with the input written on it, and all other tapes begin blank.

All commands involving tape motion are extended to allow the command to specify which tape the operation should be performed on. If no tape is specified, it is assumed that the command refers to the first tape.