

# Test Cases

## Converter

### Normal Cases:

Input	Expected	Actual
10CAFE	UTF-8: F4 8C AB BE UTF-16: DB F2 DE FE UTF-32: 00 10 CA FE	UTF-8: F4 8C AB BE UTF-16: DB F2 DE FE UTF-32: 00 10 CA FE
CAFE	UTF-8: EC AB BE UTF-16: CA FE UTF-32: 00 00 CA FE	UTF-8: EC AB BE UTF-16: CA FE UTF-32: 00 00 CA FE
EABEF	UTF-8: F3 AA AF AF UTF-16: DB 6A DF EF UTF-32: 00 0E AB EF	UTF-8: F3 AA AF AF UTF-16: DB 6A DF EF UTF-32: 00 0E AB EF
10BEEF	UTF-8: F4 8B BB AF UTF-16: DB EF DE EF UTF-32: 00 10 BE EF	UTF-8: F4 8B BB AF UTF-16: DB EF DE EF UTF-32: 00 10 BE EF
10DEAD	UTF-8: F4 8D BA AD UTF-16: DB F7 DE AD UTF-32: 00 10 DE AD	UTF-8: F4 8D BA AD UTF-16: DB F7 DE AD UTF-32: 00 10 DE AD
41	UTF-8: 41 UTF-16: 00 41 UTF-32: 00 00 00 41	UTF-8: 41 UTF-16: 00 41 UTF-32: 00 00 00 41
2	UTF-8: 02 UTF-16: 00 02 UTF-32: 00 00 00 02	UTF-8: 02 UTF-16: 00 02 UTF-32: 00 00 00 02
BDE	UTF-8: E0 AF 9E UTF-16: 0B DE UTF-32: 00 00 0B DE	UTF-8: E0 AF 9E UTF-16: 0B DE UTF-32: 00 00 0B DE

**Edge Cases:**

Input	Expected	Actual
0000	UTF-8: 00 UTF-16: 00 00 UTF-32: 00 00 00 00	UTF-8: 00 UTF-16: 00 00 UTF-32: 00 00 00 00
7F	UTF-8: 7F UTF-16: 00 7F UTF-32: 00 00 00 7F	UTF-8: 7F UTF-16: 00 7F UTF-32: 00 00 00 7F
80	UTF-8: C2 80 UTF-16: 00 80 UTF-32: 00 00 00 80	UTF-8: C2 80 UTF-16: 00 80 UTF-32: 00 00 00 80
7FF	UTF-8: DF BF UTF-16: 07 FF UTF-32: 00 00 07 FF	UTF-8: DF BF UTF-16: 07 FF UTF-32: 00 00 07 FF
800	UTF-8: E0 A0 80 UTF-16: 08 00 UTF-32: 00 00 08 00	UTF-8: E0 A0 80 UTF-16: 08 00 UTF-32: 00 00 08 00
10000	UTF-8: F0 90 80 80 UTF-16: D8 00 DC 00 UTF-32: 00 01 00 00	UTF-8: F0 90 80 80 UTF-16: D8 00 DC 00 UTF-32: 00 01 00 00
10FFFF	UTF-8: F4 8F BF BF UTF-16: DB FF DF FF UTF-32: 00 10 FF FF	UTF-8: F4 8F BF BF UTF-16: DB FF DF FF UTF-32: 00 10 FF FF
FFFF	UTF-8: EF BF BF UTF-16: FF FF UTF-32: 00 00 FF FF	UTF-8: EF BF BF UTF-16: FF FF UTF-32: 00 00 FF FF
1FFFF	UTF-8: F0 9F BF BF UTF-16: D8 3F DF FF UTF-32: 00 01 FF FF	UTF-8: F0 9F BF BF UTF-16: D8 3F DF FF UTF-32: 00 01 FF FF

**Out of Range Cases:**

Input	Expected	Actual
11FFFF	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.
-1	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.
110000	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.

**Invalid Input Cases:**

Input	Expected	Actual
ABCDEF	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.
JAKE	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.
??	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.	UTF-8: Invalid input. UTF-16: Invalid input. UTF-32: Invalid input.

## Translator

### Normal Cases:

Input	Expected	Actual
UTF-8: F4 8C AB BE UTF-16: DB F2 DE FE UTF-32: 00 10 CA FE	10CAFE	10CAFE
UTF-8: F3 AA AF AF UTF-16: DB 6A DF EF UTF-32: 00 0E AB EF	EABEF	EABEF
UTF-8: F4 8D BA AD UTF-16: DB F7 DE AD UTF-32: 00 10 DE AD	10DEAD	10DEAD
UTF-8: 02 UTF-16: 00 02 UTF-32: 00 00 00 02	2	2
UTF-8: E0 AF 9E UTF-16: 0B DE UTF-32: 00 00 0B DE	BDE	BDE

**Edge Cases:**

Input	Expected	Actual
UTF-8: 00 UTF-16: 00 00 UTF-32: 00 00 00 00	0	0
UTF-8: F0 90 80 80 UTF-16: D8 00 DC 00 UTF-32: 00 01 00 00	10000	10000
UTF-8: F4 8F BF BF UTF-16: DB FF DF FF UTF-32: 00 10 FF FF	10FFFF	10FFFF
UTF-8: EF BF BF UTF-16: FF FF UTF-32: 00 00 FF FF	FFFF	FFFF
UTF-8: F0 9F BF BF UTF-16: D8 3F DF FF UTF-32: 00 01 FF FF	1FFFF	1FFFF

**Out of Range Cases:**

UTF-8		
Input	Expected	Actual
80	Invalid UTF: Out of range.	Invalid UTF: Out of range.
FF	Invalid UTF: Out of range.	Invalid UTF: Out of range.
AA	Invalid UTF: Out of range.	Invalid UTF: Out of range.

UTF-16		
Input	Expected	Actual
DBFF FFFF	Invalid UTF: Out of range.	Invalid UTF: Out of range.
FFFF BFFF	Invalid UTF: Out of range.	Invalid UTF: Out of range.
AAAAA	Invalid UTF: Out of range.	Invalid UTF: Out of range.

UTF-32		
Input	Expected	Actual
10FFFFFF	Invalid UTF: Out of range.	Invalid UTF: Out of range.
110000	Invalid UTF: Out of range.	Invalid UTF: Out of range.
ABABAB	Invalid UTF: Out of range.	Invalid UTF: Out of range.

**Invalid Input Cases:**

<b>Input</b>	<b>Expected</b>	<b>Actual</b>
000000000	Invalid UTF: Either out of range or contains invalid digits.	Invalid UTF: Either out of range or contains invalid digits.
Nah I'd Win	Invalid UTF: Either out of range or contains invalid digits.	Invalid UTF: Either out of range or contains invalid digits.
!!{}{}	Invalid UTF: Either out of range or contains invalid digits.	Invalid UTF: Either out of range or contains invalid digits.

# Screenshots

## Converter Normal Cases:





Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10BEEF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: F4 8B BB AF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10BEEF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: DB EF DE EF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10BEEF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 10 BE EF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10DEAD

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: F4 8D BA AD

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10DEAD

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: DB F7 DE AD

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10DEAD

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 10 DE AD

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 41

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: 41

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 41

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: 00 41

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 41

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 00 00 41

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-8: 02

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-16: 00 02

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-32: 00 00 00 02

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-8: E0 AF 9E

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-16: 0B DE

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-32: 00 00 0B DE

# Converter Edge Cases:

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 0000

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: 00

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 0000

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: 00 00

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 0000

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 00 00 00

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 7F

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: 7F

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 7F

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: 00 7F

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 7F

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 00 00 7F

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 80

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: C2 80

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 80

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: 00 80

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 80

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 00 00 80

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-8: DF BF

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-16: 07 FF

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-32: 00 00 07 FF

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-8: E0 A0 80

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-16: 08 00

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-32: 00 00 08 00

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-8: F0 90 80 80

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-16: D8 00 DC 00

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

UTF-32: 00 01 00 00

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: F4 8F BF BF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: DB FF DF FF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 10FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 10 FF FF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: EF BF BF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: FF FF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-32: 00 00 FF FF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 1FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-8: F0 9F BF BF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 1FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

Translate from: UTF-8 UTF-16 UTF-32

Output:

UTF-16: D8 3F DF FF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+ 1FFFF

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

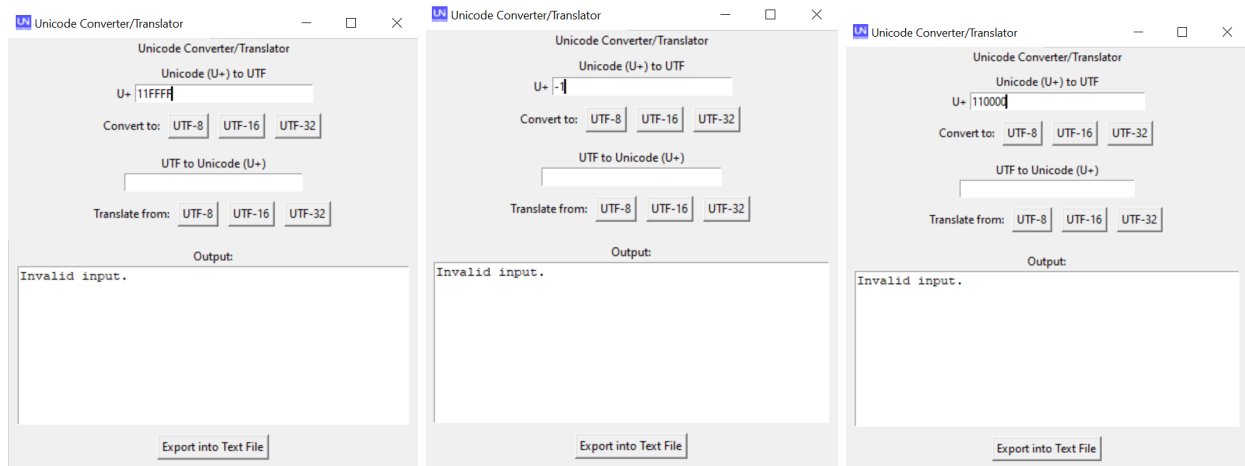
Translate from: UTF-8 UTF-16 UTF-32

Output:

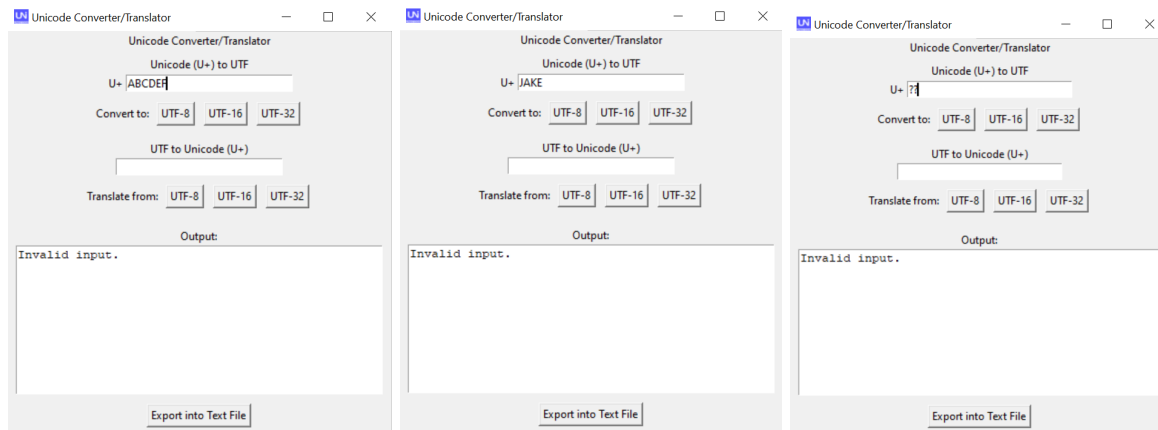
UTF-32: 00 01 FF FF

Export into Text File

## Converter Out of Range Cases:



## Converter Invalid Input Cases:



# Translator Normal Cases:

The image displays nine instances of the 'Unicode Converter/Translator' application, arranged in a 3x3 grid. Each window shows the 'Unicode (U+) to UTF' and 'UTF to Unicode (U+)' conversion options. The input fields contain different hex values, and the output fields show the resulting Unicode code points.

Input Hex (UTF to Unicode)	Output Unicode (U+)
F4 8C AB B6	U+10CAFE
DB F2 DE FE	U+10CAFE
00 10 CA F6	U+10CAFE
F3 AA AF AF	U+EABEF
DB 6A DF EF	U+EABEF
00 0E AB EF	U+EABEF
F4 8D BA AD	U+10DEAD
DB F7 DE AD	U+10DEAD
00 10 DE AD	U+10DEAD

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

U+2

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

U+2

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

U+2

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

U+BDE

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

U+BDE

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to:

UTF to Unicode (U+)

Translate from:

Output:

U+BDE



# Translator Edge Cases:

The image displays nine instances of the 'Unicode Converter/Translator' application, arranged in a 3x3 grid. Each window shows a different edge case for Unicode conversion. The interface for each window includes a title bar, a 'Unicode (U+) to UTF' section with a 'U+' input field and 'Convert to' buttons (UTF-8, UTF-16, UTF-32), a 'UTF to Unicode (U+)' section with a 'UTF' input field and 'Translate from' buttons (UTF-8, UTF-16, UTF-32), an 'Output' text area, and an 'Export into Text File' button.

- Top Left:** 'U+' is empty, 'UTF' is '00'. Output: 'U+0'.
- Top Middle:** 'U+' is empty, 'UTF' is '00 00'. Output: 'U+0'.
- Top Right:** 'U+' is empty, 'UTF' is '00 00 00 00'. Output: 'U+0'.
- Middle Left:** 'U+' is empty, 'UTF' is 'F0 90 80 80'. Output: 'U+10000'.
- Middle Middle:** 'U+' is empty, 'UTF' is 'D8 00 DC 00'. Output: 'U+10000'.
- Middle Right:** 'U+' is empty, 'UTF' is '00 01 00 00'. Output: 'U+10000'.
- Bottom Left:** 'U+' is empty, 'UTF' is 'F4 8F BF B8'. Output: 'U+10FFFF'.
- Bottom Middle:** 'U+' is empty, 'UTF' is 'DB FF DF FF'. Output: 'U+10FFFF'.
- Bottom Right:** 'U+' is empty, 'UTF' is '00 10 FF FF'. Output: 'U+10FFFF'.

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

EF BF BD

Translate from: UTF-8 UTF-16 UTF-32

Output:

U+FFFF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

FF FF

Translate from: UTF-8 UTF-16 UTF-32

Output:

U+FFFF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

00 00 FF FF

Translate from: UTF-8 UTF-16 UTF-32

Output:

U+FFFF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

F0 9F BF BF

Translate from: UTF-8 UTF-16 UTF-32

Output:

U+1FFFF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

D8 3F DF FF

Translate from: UTF-8 UTF-16 UTF-32

Output:

U+1FFFF

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

00 01 FF FF

Translate from: UTF-8 UTF-16 UTF-32

Output:

U+1FFFF

Export into Text File

## Translator Out of Range Cases (UTF-8 to Unicode):

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

80

Translate from: UTF-8 UTF-16 UTF-32

Output:

Invalid UTF: Out of range.

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

FF

Translate from: UTF-8 UTF-16 UTF-32

Output:

Invalid UTF: Out of range.

Export into Text File

Unicode Converter/Translator

Unicode (U+) to UTF

U+

Convert to: UTF-8 UTF-16 UTF-32

UTF to Unicode (U+)

AA

Translate from: UTF-8 UTF-16 UTF-32

Output:

Invalid UTF: Out of range.

Export into Text File

## Translator Out of Range Cases (UTF-16 to Unicode):

The image shows three instances of the 'Unicode Converter/Translator' application. Each instance has a title bar with the application name and standard window controls. The main interface is divided into several sections: 'Unicode (U+) to UTF' with a 'U+' input field and 'Convert to' buttons for UTF-8, UTF-16, and UTF-32; 'UTF to Unicode (U+)' with a text input field and 'Translate from' buttons for UTF-8, UTF-16, and UTF-32; and an 'Output' section. In the first instance, the 'UTF to Unicode (U+)' field contains 'DBFF FFF' and the output is 'Invalid UTF: Out of range.' In the second instance, it contains 'FFFF BFFF' and the output is the same. In the third instance, it contains 'AAAAA' and the output is the same. Each instance has an 'Export into Text File' button at the bottom.

## Translator Out of Range Cases (UTF-32 to Unicode):

The image shows three instances of the 'Unicode Converter/Translator' application. Each instance has a title bar with the application name and standard window controls. The main interface is divided into several sections: 'Unicode (U+) to UTF' with a 'U+' input field and 'Convert to' buttons for UTF-8, UTF-16, and UTF-32; 'UTF to Unicode (U+)' with a text input field and 'Translate from' buttons for UTF-8, UTF-16, and UTF-32; and an 'Output' section. In the first instance, the 'UTF to Unicode (U+)' field contains '10FFFFFF' and the output is 'Invalid UTF: Out of range.' In the second instance, it contains '110000' and the output is the same. In the third instance, it contains 'ABABAB' and the output is the same. Each instance has an 'Export into Text File' button at the bottom.

## Translator Invalid Input Cases:

The image shows three instances of the 'Unicode Converter/Translator' application. Each instance has a title bar with the application name and standard window controls. The main interface is divided into several sections: 'Unicode (U+) to UTF' with a 'U+' input field and 'Convert to' buttons for UTF-8, UTF-16, and UTF-32; 'UTF to Unicode (U+)' with a text input field and 'Translate from' buttons for UTF-8, UTF-16, and UTF-32; and an 'Output' section. In the first instance, the 'UTF to Unicode (U+)' field contains '00000000' and the output is 'Invalid UTF: Either out of range or contains invalid digits.' In the second instance, it contains 'Nah I'd Win' and the output is the same. In the third instance, it contains '!(X)' and the output is the same. Each instance has an 'Export into Text File' button at the bottom.

# Analysis Writeup

## Problems Encountered and Solutions Implemented

### Valid Input Validation

#### **Problem:**

The program was mistakenly accepting inputs that weren't valid hexadecimal digits, leading to conversion errors. Valid hex digits should be within 0-9 and A-F or a-f for lowercase, but inputs outside this range caused issues.

#### **Solution:**

A fix was implemented by creating a reference string of all valid hexadecimal characters '0123456789ABCDEF' and 'abcdef' for lowercase. Now, before conversion, the program checks each input character against this reference. Any input not matching is rejected, prompting the user to enter valid hexadecimal digits only. This solution ensures that only appropriate hex format inputs are processed, significantly reducing conversion errors and improving input validation reliability.

### Length Input Validation

#### **Problem:**

For the conversion from Unicode to UTF, having 000245D6 as an input was outputting "Invalid input."

#### **Solution:**

The input validation was modified to accept Hexadecimal inputs with a length of more than 6. (i.e. removed the if statement `(len(unicode) <= 6)`)

### Incorrect Output in converting to UTF-8

#### **Problem:**

The program had incorrect outputs for converting to UTF-8 for hex values with a number of bits that are not exactly 21, 16, or 11.

#### **Solution:**

When analyzing how it was converted step by step, it was identified that it did not zero extend for the remaining bits needed. To fix this, we zero-extended the binary value to exactly 21, 16, or 11 (depending on the number of bits needed) before starting the conversion.

## **User Interface Input Clarity Enhancement:**

### **Problem:**

Initially, the application featured a single input field intended for both conversion and translation processes. This design led to confusion, particularly because inputs for the Unicode converter required a U+ prefix to ensure that it was code point/unicode, a detail not intuitively clear to users.

### **Solution:**

To address this confusion and enhance the user experience, we redesigned the user interface by dividing the single input field into two distinct fields: one dedicated to conversion and the other to translation. To improve clarity for Unicode conversion, a "U+" label was introduced adjacent to the input box on the user interface. This visual cue guides users to prepend their inputs with "U+" when required for Unicode conversion. As a result, the interface became more user-friendly and eliminated the ambiguity surrounding input requirements, thereby streamlining the input process for users.

## **Range of UTF-8**

### **Problem:**

When converting Unicode character U+80 to UTF-8, the output appeared as 80 instead of C2 80.

### **Solution:**

We modified the range for cases with 7 bits of code point from 0xFF to 0x7F (i.e. edited `if int(unicode, 16) <= 0xFF: to if 0x00 <= int(unicode, 16) <= 0x7F:`)